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New Features for the New Year.

SOME changes in the appearance and character of the contents of this journal are introduced in the present issue in the hope that they will share the same cordial appreciation which has been bestowed upon our past efforts to render THE INDIA RUBBER WORLD of interest and value to the trade. The new features form part of the plans which the management have in hand for fulfilling their standing promise to the readers of the paper to keep it steadily in the forefront in the ranks of trades-journalism. The support which has been received from the rubber trade in this enterprise, always of the most liberal sort, has reached such proportions as to justify increased expenditures for the benefit of our readers.

It is our aim to secure the freshest and best reading matter in the field covered by the original prospectus of this paper, written by the most capable men, to be presented in the most attractive shape, including the more extensive use of illustrations than heretofore. It is intended, besides, to enlarge the variety of topics to which the paper is devoted, especially with a view to pointing out new practical uses for rubber and new materials or methods for the use of rubber-manufacturers. The names of contributors printed in this number by no means represent all whose pens have been engaged to interest or instruct the patrons of the paper. Nor is the fact that a large number of writers have been arranged with already any reason why any one having something likely to be of value to the trade should not undertake to become a contributor. America has taken the first rank in the rubber industry, and our purpose is to give America the best journal published in the interest of this industry.

The present number is labelled "Mechanical Goods Edition" on account of the special attention given this month to the manufactures in this line, and because an extra number of copies has been called for on behalf of the mechanical-goods trade. It may be added that this is the first of a series of special editions, one to be devoted to each leading branch of the rubber industry until the list is exhausted. But there is no intention, meanwhile, to slight any of the regular features of THE INDIA RUBBER WORLD as an all-around rubber-trade journal. All the various departments will be kept up, and every effort will be made to add to their completeness and trustworthiness. While our rule has been to say little about ourselves, preferring to let the paper speak through the character of its contents, it has seemed that upon the threshold of a marked change in both looks and character, our friends are entitled to a few words of explanation.

Inferior Rubber Goods in Hardware Stores.

THE attention of rubber-men can hardly fail to be attracted by the extracts from our correspondence with hardwaremen given in another part of this magazine. Evidently there are not a few hardware-dealers in the smaller centers of trade, who, though they may be intelligent and successful merchants in other respects, are selling India-rubber manufactures of a poor grade under the impression that only poor grades are to be had. The number of hardwaremen in the United States is legion, and the small dealers form the most important part of the trade, for the reason that they come nearer to the consumer. As the hardware trade constantly becomes a wider channel for the sale of certain lines of rubber goods it is worth while for manufacturers of the better class of such goods to try to impress upon these small dealers how to buy intelligently.

It is of course absurd to suppose that no rubber goods are made to-day equal in quality to those of any former period. It might as reasonably be claimed that we do not make as good cloth as formerly, or as good cutlery, or build as good bridges, or as good railroads, or have as good electric-lights, or farm as well as our forefathers. One might as well assert that the crude Spanish waterproof goods made in Torquemada's time were as good as those which Charles Goodyear lived to see, as to claim that since Goodyear's death our manufacturers, with the employment of skill and capital and thought and effort, have not succeeded in producing better articles of every character in which use is made of rubber in manufacturing. It is to the interest of the manufacturer to make better goods with each year of his career, for the reason that the profit on good wares is bound to be greater in the end, even if the profit on sales at first might be larger through the employment of dishonesty in materials or methods. Not only are better rubber goods made in this country to-day than the world ever saw before, but prices have decreased while quality has improved.

It must be admitted that all rubber goods are not first-class—there are too many "seconds" on the market, and some goods which, while of the best quality made by certain firms, are worse than "seconds." But the failure of so many hardwaremen in so many parts of the country to buy good wares by no means proves that good wares are not to be had at reasonable prices. The point is made by some of our correspondents that the buying-public is to blame for the prevalence in some sections of the poor quality of rubber goods, on account of an effort to buy something for as nearly nothing as possible. Crude rubber, to begin with, is an expensive commodity. The machinery requisite for its manipulation is costly, skilled labor is required to prepare it in merchantable shapes, and the various materials which are as essential in the manufacture of rubber goods as the rubber itself all cost money if they are of good quality. It is plain, therefore, that a point is easily reached below which no honestly-made goods can be sold at a profit. The buyer of rubber goods therefore wants to ask himself whether or not the prices quoted to him are high enough to make it reasonable to suppose that a good article can be expected.

The leading manufacturers of such rubber goods as hardware-dealers in this country carry in stock are represented in the larger cities by general agents, and these supply the trade in large measure in their representative localities. In New York, Philadelphia, Chicago and elsewhere the leading hardware merchants have not attempted to compete with the regular rubber-houses in their cities. They have preferred to hand over any orders received by them from country customers to be filled by the rubber-houses proper. In one important Western city the agency of a large Eastern rubber-manufacture is in the hands of the leading hardware-house there, showing that there is some natural relation between the sale of mechanical rubber goods and metal hardware. The explanation of the fact that so many hardwaremen in smaller towns seem to be afflicted with worthless stocks of rubber is that they have been buying from small rubber-firms with limited capital possibly, and no reputation in particular to sustain; who have been endeavoring to undersell the standard products of the old and more substantial rubber-companies. Their cut prices have attracted the inexperienced buyer in the hardware line, and doubtless many localities have been flooded with articles of rubber manufacture which are having the effect of discrediting the whole industry.

A Chance to "Get Left."

JUST now throughout the United States there is a marked scarcity of lumberman's shoes and of Arctics. This was predicted long ago by those who were acquainted with the stocks of retailers and jobbers, but for some reason the rubber boot-and-shoe men did not see fit to manufacture these goods ahead. So far almost everywhere the winter has been mild. There have been, to be sure, a few incipient blizzards in the Northwest, but there has been no extraordinary call for these goods, and yet the supply is nearly exhausted. It might be thought that it would be an easy matter for the mills to start up and in a short time make enough to supply any sudden and extraordinary demand. This, however, is not so easy, for the factories are busy and more than busy on regular goods. In addition to this the mills that supply linings, not feeling sure of a market, have not made up a large supply of their goods, and hence a shortage is likely to be found there. Now according to those who are weather-wise, before the first of February winter will have set in in earnest. The time-honored goose-bone predicts heavy storms, cold weather, and plenty of snow; and that, too, not alone for New England, but for the whole country. All of which means a shortage in Arctics and a consequent disappointment for retailer, jobber and manufacturer; unless of course it happens the other way.

THE Dry-Goods trade of New York has inaugurated an active movement to have the City and State represented adequately at the World's Fair of 1893, and we hope that the India-Rubber trade will lend its most enthusiastic support to the movement.

NEW GOODS IN THE MARKET.

WHEN one gives another a "tip" it is usually an attempt to do a favor. It is none the less a favor when tips are sold, when they are of the class offered to the trade by the Elastic Tip Co., of Boston. One who has been in any large gathering, where the audience is seated in movable chairs, is aware of the constant noise and confusion from the moving of the chairs. To obviate this a little rubber buffer is placed at the bottom of each chair-leg, which entirely



THE OLD WAY—WALLS MARKED BY FURNITURE.

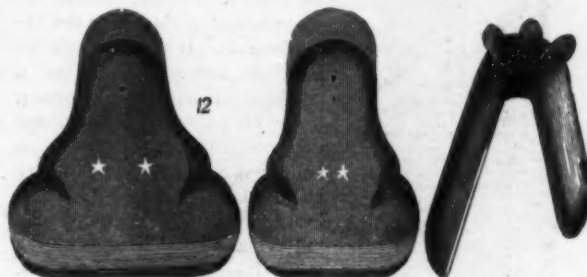
does away with this disagreeable sound. So popular has this idea become that it is in wide use already in hotels, public halls, clubs, and even in households. These tips are most effective as buffers on the rocker of that New England idol, the family rocking-chair. The strange manner in which one of these chairs will back up against a wall and gouge its fair surface before one is aware of it, is known to every housekeeper.



THE NEW WAY—FURNITURE TIPPED WITH RUBBER.

When the elastic tip is applied to ordinary chairs, they not only are rendered noiseless when handled, but the four legs bear more uniformly upon the floor, carpets are not injured by the chair-legs, and the seat is made easy, soft and elastic. This principle is capable of almost indefinite extension. Thus they may be applied to desk-covers and to the parts of opera-chairs

which come together in closing. The advantage of the manufacture of these buffers by a well-equipped company seeking to meet the wants of the trade is that a better article can be supplied, and at lower prices, than the home-made, ill-shaped



PATENT ROCKING-CHAIR TIPS.

buffers which some furniture-manufacturers, dealers and cabinet workers have placed upon their wares heretofore. The extensive catalogue of the firm named includes descriptions and engravings of a great variety of rubber tips, from which almost every want in this line, it would seem, can be filled. Some of the tips are nothing more than rubber-head tacks and nails, which any one may attach readily with a hammer. A special bit is sold for attaching those tips requiring a more substantial connection with the furniture. Cane-tips and crutch-bottoms are also made, together with door-stop tips, fencing-foil caps and many other similar articles.



FENCING-FOIL CAPS.

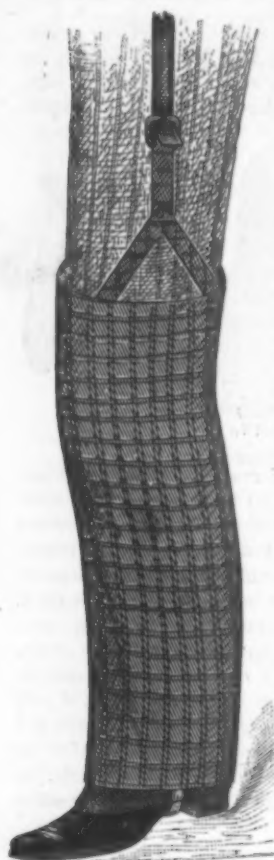
Tuerk's Hose Band Clamp.

A HOSE band clamp designed to prevent the bending or pinching of the hose, causing it to lift or pucker on the coupling, thus resulting in a leak, is manufactured by the Tuerk Water-Meter Co., Fulton, N. Y., and illustrated in the engraving shown herewith. The Clamp is shown with the screw-bolt removed and the tongues at C in position to press the hose tight down between the ends of the Clamp. When the Clamp is tightened, by the insertion of the bolt, the tongues at C are forced between the hose and Clamp, keeping the hose pressed down as firmly between the lugs as at any other point. The object has been to produce a clamp which shall completely surround the hose, with equal pressure at all points, instead of leaving a portion of the hose unprotected between the lugs, as was the case with the clamps made before the invention of this new feature—the use of tongues to complete the circle. This Clamp is made to suit hose of different plies in thickness. The catalogue of the manufacturers enumerates eleven sizes for hydrant-hose and as many for steam-hose and brewer's hose. Odd sizes are to be had on order. The Clamp can be used for spiral-wound suction-hose.



Macomber's Storm Trousers.

THE illustration herewith relates to an invention by Clarence R. Macomber, of Worcester, Mass, the patenting of which was

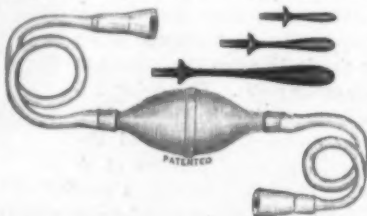


oned in this paper in October last. This new article of apparel now is being placed upon the market by the Clifton Manufacturing Co., No. 65 Franklin street, Boston, under an arrangement giving them the exclusive sale. It is a substitute for a rubber boot, consisting of a combination legging and gaiter, made of mackintosh cloth, and designed to fit neatly over a rubber worn on any ordinary shoe. In appearance the new article resembles a trousers-leg cut off a few inches above the knee. It is worn over the trousers, being made large enough to prevent any creasing. The gaiter is of a new design, cemented to the legging in a water-proof joint. It is described as a practical and very unique arrangement and when put on the appearance is exactly like a pair of trousers. It affords protection against the storm; does not wrinkle the trousers-leg; can be put into small space; is always ready and easily put on, and can be made from any pattern of cloth and to match the mackintosh coat if desired. With a good mackintosh coat and a pair of Macomber's Storm Trousers a gentleman is as

nearly proof against damage from the storm as it is possible to make him. In horseback riding they make an agreeable substitute for leggings, both in fair weather and foul. In cold weather they make a protection from the cold, especially while riding or driving. The cost it is stated, will not exceed that of ordinary rubber boots.

A Syringe With New Features.

A NEWLY-PATENTED syringe possessing several points of interest is illustrated herewith. Heretofore, in the manufacture of goods of this class it has been customary to form a valve-seat or a casing provided with a valve-seat in more than one part, and place the valve in position before joining these parts together, but in the syringe now illustrated the construction is simplified and the casing and the valve-seat are formed of a single piece. The valve-seat and casing are integrally formed of rubber or other yielding substance with a longitudinal opening passing through it. The chamber is round at one end to form a valve-seat, and at the other end is an annular shoulder with projections forming a space between them for the escape of fluid. The valve-chamber is forced through the



longitudinal opening, the face of it being placed opposite the projection, and it is not often necessary to remove it. In operating the valve is forced to its seat, and another valve is forced upon the projection forcing the fluid out and is withdrawn by an opposite action. The chief feature in this syringe is its simplicity, since it requires no separation, for cleaning, since the parts, being of rubber, will not corrode. As the parts are practically inseparable, one from another, they are not apt to get lost, and in its relative cheapness, this syringe bids fair to become very popular. Manufactured by the Vant Woud Rubber Co., No. 26 Frankfort street, New York.

Rubber Wheel for Cleansing Barrels.

THE mechanical-goods manufacturers always have had an especially good trade with the brewers of the United States. The sales to them, however, have been chiefly in the line of brewers' hose. An article that is fast finding its way into all



of the larger breweries is what is known as the Brewers' Wheel. It is made of a fine grade of rubber, and with the mechanism that is attached to it is singularly effective in cleaning empty barrels. As the brewers without exception seek the return of their own packages, and as they are often extremely sour and dirty,

a mechanical contrivance that will cleanse them rapidly is highly appreciated. The brewers' wheel shown in the illustration is one manufactured by the Home Rubber Co., of Trenton, N. J., and an article of which they are selling large quantities.

The Hoyt Lawn-Sprinkler.

THIS is an article which is sure to prove popular with every man who has experienced the tediousness of sprinkling a lawn with a hand-hose, or who has grown weary of the ungraceful twistings of the regulation revolving sprinkler. As may be seen by the accompanying illustration the hose is coupled to the base of the stand.

A portion of the water, passing through a small iron pipe and falling into the buckets of the water-wheel, seen on the left, causes the wheel to revolve, carrying with it a shaft and small pinion. This pinion works in cogs on the large top ring of the sprinkler and carries the ring around in a circle. A short piece of hose connects the base and the nozzle attached to the revolving ring. As the wheel revolves the water is thrown over a circle the diameter of which is twice as great as the distance the stream plays. By bringing the stream against a revolving spray fan, shown at top of the cut, a spray of almost mist-like fineness is produced. The sprinkler is adapted to all purposes as it can be regulated to throw a variety of streams and proves a great saver of water



and of labor. Those who have made use of it are enthusiastic in its praise. Gilbride & Grey, Nos. 49-50 South Market street, Boston, are the agents for New England.

The Peerless Hose-Nozzles.

THE season being at hand for sending in orders for garden-hose and hose-goods, the trade will be interested in hose-nozzles—an article not always as satisfactory in use as could be desired. Those who have not investigated the Peerless Hose-Nozzles,



which are represented in the accompanying engravings, might take advantage of the time to elapse before the beginning of summer to correspond with the manufacturers. These nozzles give a perfect, solid stream or spray, have no plug-cocks, cams or rubber or leather valves. The packing is of solid felt, made to stand in the garden-hose a pressure of 100 pounds without leaking. The stream is controlled simply by turning the sleeve or outside of the nozzle around the center, and the stream may be changed easily and quickly from a solid

stream to a coarse or fine spray or entirely shut off. The force of the water will not in the slightest affect the way in which the nozzle is set. These nozzles are manufactured in all sizes for garden-hose and fire-hose, and in a variety of styles. Made by the H. A. Williams Manufacturing Co., Nos. 332-336 Congress street, Boston.

The Perforated Frictional Belt.

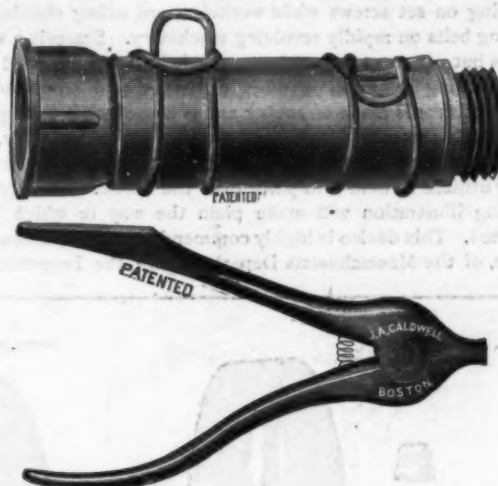
A MEDICINAL use of India-rubber is illustrated in a frictional belt, of which an engraving is introduced herewith. The article has been in the market for many years, but attention is called to it now on account of recent improvements in its manufacture, including the putting on of new straps and heavier buckles, and a general improvement in neatness of appearance. Its operation is on the principle of friction. The lining being of flannel, and



the outside any suitable material, united and made elastic by a rubber composition by patented process, and being adapted to the contour of the body, each motion produces the needed friction and warmth; the pores are opened, the humor exudes and passes off. It is recommended for rheumatism, lame back and derangements of the bowels, and also as an abdominal support. Manufactured by the Tyer Rubber Co., Andover, Mass.

The Caldwell Hose-Strap.

AMONG the numerous devices on the market for fastening rubber hose to couplings readily, the Caldwell Patent Hose-Strap is one of the most practical. It is so simple in construction that the engraving herewith describes it even better than words can. The tool that goes with the strap, however, perhaps needs a word of description. The finished arm is used for bringing the small end of the strap through the larger end when drawn around the hose enough to admit the rods of



the fastener, which when inserted and spread exert a powerful leverage and tighten the strap. The arrangement is so simple that any one can use it, and the wire sets the hose into the corrugations of the coupling and makes it absolutely air and water-tight. The straps are used on garden-hose and also on air-brake, engine and tender-hose. They are made for all the regular sizes of hose and are to-day on sale with almost all of the supply men. Manufactured by C. S. Knowles, No. 7 Arch street, Boston.

An Electric Car-Connector.

WHEREVER street-cars or railroad trains are lighted by electricity, the circuits in the different cars must be completed through a suitable connector. This connector must have its two parts interchangeable so that the cars can be turned end for end without interfering with its usefulness. It must also be so made as to make it impossible for any one to get a shock from it. This is especially important in the case of the electric street-railroad systems, where the current at 500 volts pressure gives a quite unpleasant shock. For this purpose George Cutter, the electric specialist of Chicago, has developed the connector devised by Mr. Charles G. Armstrong of the same city. This

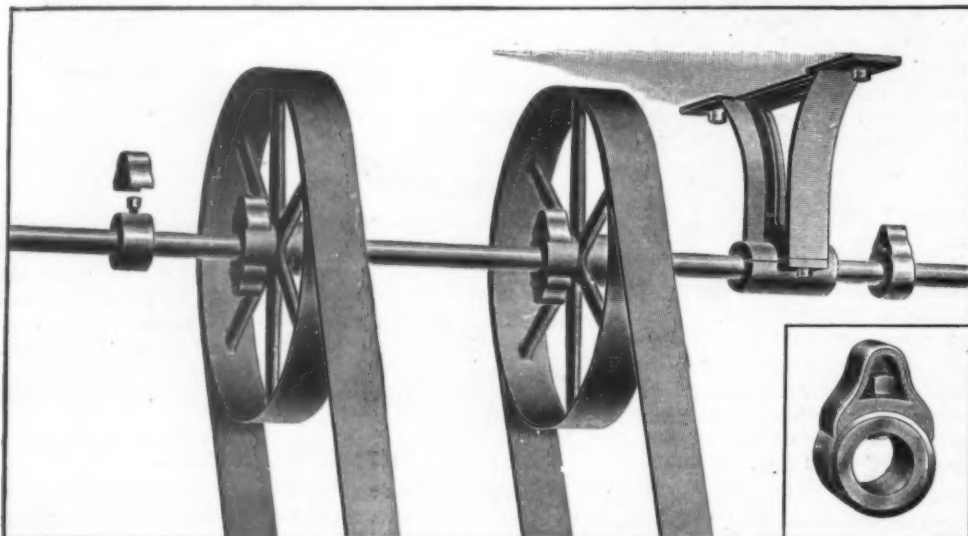


has each part made of hard rubber, with one metal terminal projecting, while the other is adapted to be soldered to the end of the conducting cord. While the parts are separated, the rubber insulates the projecting ends from the circuit, so that these ends can be safely handled. On slipping the two halves together, each end closes the circuit between the two metal parts in the other half, the whole forming a good metallic circuit. This connector is water-proof, and being made entirely of brass and hard rubber, will wear for years. It is but a trifle

larger than the cut shown herewith, and George Cutter is fitting up a number of roads with it. His address is No. 333 "The Rookery," Chicago.

A Protector for Factory Workers.

READERS of the calamity columns in our newspapers, as well as all manufacturers, will welcome the Eureka Set Screw Protector recently brought out. This device is the result of long study on the part of the inventor, who had been impressed by the number of accidents occurring in manufactories by clothing catching on set screws while workmen are oiling shafting or shifting belts on rapidly revolving machinery. Scarcely a week passes but one or more accidents of this kind are recorded and the resulting litigation is often expensive and troublesome. The Protector is made of rubber and is coated with a preparation which protects it from oil so that it will last for years. It is easily applied by any workman, the elasticity of the rubber being utilized to hold it in place over the screw. The accompanying illustration will make plain the way in which it is attached. This device is highly commended by Chief Inspector Wade, of the Massachusetts Department for the Inspection of



Factories and Workshops, and has been adopted already by a large number of leading manufacturers, among which are the Boston Rubber Shoe Co. Walmsley, King & Warren, No. 105 Summer street, Boston, are the manufacturers.

Ring, Sectional and Spiral Packing.

THE manufacture of packings for steam and water use is an industry that within a few years has assumed large proportions. As different packing problems arose practical men bent their energies to this solution, with the result that to-day the preparation of these goods is an exact science. Taken as a whole rubber packing has been the most satisfactory. What is known as the Elastic Ring Packing is perhaps the simplest form of rubber packing.

This is cut out of many-ply sheets in the shape of rings, making a perfect fit for both rod and box. It is subjected to a lubricating process after cutting, and is made in any size from $\frac{3}{8}$ to 30 inches in diameter. Where rods are smooth and true, and the

boxes and glands carefully beveled this type of packing gives excellent results. What is known as the Sectional Ring Packing is automatic in its action. When in use the glands serve only to hold the packing in the box while the cylinder pressure forces the sections together making it absolutely impossible for gas, water or steam to make its way through.

This packing is made in response to a call for something that can be used where ordinary packing cannot make tight joints. It has been used very successfully for ammonia, and for cut rods, rods that are out of line and flat-bottom stuffing-boxes. This from its nature must be made thick as a light ring made sectionally would be of no special advantage. A special lubricating process



is also used in the treatment of this packing. An extension of the ring idea is found in the Spiral Packing. It is made in the form of a continuous ring around a mandrel that is an exact duplicate of a piston-rod. While in this position it is impregnated with a lubricating compound. As it is sold in spirals it entirely does away with the trouble of bending it around the rods, and it is always ready for use. This is made in sizes from $\frac{3}{8}$ to 2 inches and carefully packed in boxes that effectually excludes all dust or grit. Each box contains twelve feet of the packing. All of the three types of packing mentioned above are the sub-

jects of patents, and are manufactured by the Garlock Packing Co., Palmyra, N. Y.

The New Bieder Hose Strap.

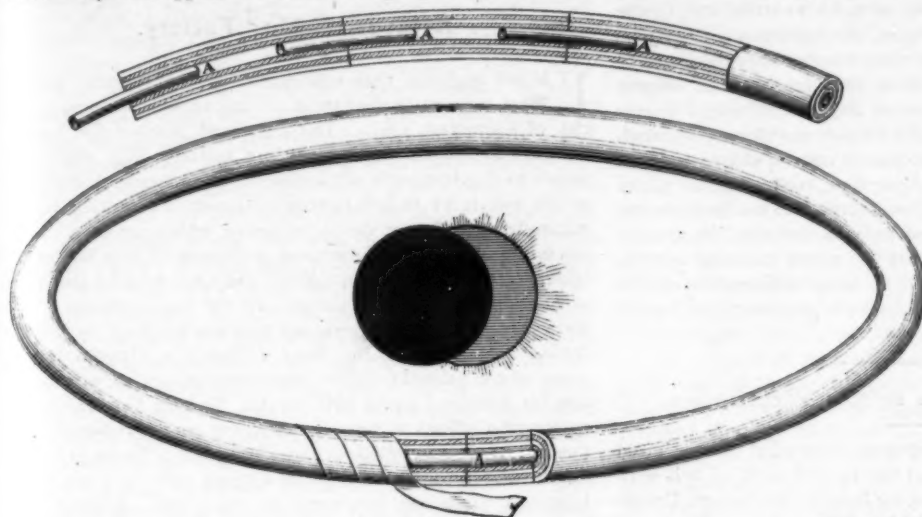
THE illustration herewith shows a new hose strap made of a single brass wire, and also the method of tightening the same on the hose by means of pliers.



It is stated that this Strap is fully warranted to stand any reasonable amount of pressure that may be put upon it. The use of pliers or other special tool, by the way, is not essential in fastening this Strap; some of the illustrations of it published show a large nail used for the purpose. The advantages claimed are simplicity and rapidity in use and also a tight fastening. One size will answer for each size of hose, irrespective of ply. Made by the Cleveland (Ohio) Novelty Co.; sold in the East by the Ross & Fuller Association, No. 33 Chambers street, New York.

The Eclipse Gasket.

AN invention that does away with much of the trouble incident to the use of the ordinary gasket is the Eclipse Sectional Rainbow Gasket, which is here illustrated. This is made up as a long hollow tube, and is semi-vulcanized. When the engineer wishes to pack a joint he cuts off a length of the tubing, fits a little metal connection into the hollow ends, winds the joints with friction tape and applies it. Under a slight pressure it flattens



into the proper shape, vulcanizes and is immediately a full-fledged rubber gasket, as perfect as the molded one. The tubes are made in three sizes and therefore will fit any place where gaskets are used. The manufacturers have adopted and secured as a trade-mark the word "Eclipse" printed in black across, a red sphere, representing an eclipse of the sun, which will appear on the box labels containing the genuine goods of their production. Made by the Peerless Rubber Manufacturing Co., No. 15 Warren street, New York.

An Important Patent Suit.

IN view of the extensive use of corrugated rubber mats the recent decision (December 24, 1891) of the United States Circuit Court for Southern New York, made by the Hon. Alfred C. Coxe, in the case of the New York Belting and Packing Co. against the New Jersey Car Spring and Rubber Co., is of great interest. This was a suit for infringement of letters patent No. 11,208, granted May 27, 1879, for a new and useful design for rubber mats. The decision was in favor of the plaintiff, establishing the validity of the patent and adjudging infringement of the third claim, viz.:

"A design for a rubber mat, consisting of a series of parallel corrugations, depressions or ridges arranged in sections, the general line of direction of the corrugations in one section making angles with or being deflected to meet those of the corrugations in the contiguous or other sections, substantially as described."

This suit has been hotly contested. When it came first before the Circuit Court the patent was held to be invalid, but upon an appeal being made to the Supreme Court, the case was sent back to the Circuit Court, with the result just cited. The drawing of the patent shows a square mat. The infringing mat was oblong. The patent, however, expressly stated that while the mat as depicted was square, "it might be oblong or other desired shape." In respect to the distinctions sought to be made

between the design shown in the drawing of the patent and the design embodied in the oblong mat of the defendant, the judge decided:

"If a square is stretched out into a rectangle it is very clear that it will look no longer like a square. It is impossible for the central panel of an oblong mat to retain all the characteristics of the central panel of a square mat. * * * All the distinguishing features of the infringing mat are taken from the design. The man who produced the [defendant's] mat evidently had the design before him."

The opinion would seem to give a very broad construction to the patent and give its owners the exclusive right to put upon the market mats containing a design of the general character of the claim quoted, which all salable mats of this class have for some time past embodied. It would seem, also to render all persons using mats embodying this particular design liable to suit for profits and damages—customers as well as the manufacturers themselves.

Para Stocks in New York.

THE following statistics of Pará rubber receipts in New York during each of the twelve months of 1891, together with the deliveries and the stocks at the end of each month have been prepared by De Long, Betts & Co., No. 51 Stone street. They are the result of what are to be believed to be careful estimates. The figures given indicate tons of 2240 pounds.

MONTH.	ARRIVALS.			DELIVERIES.			STOCK AT END OF MONTH.		
	Fine and Med'm	Coarse	Caucho	Fine and Med'm	Coarse	Caucho	Fine and Med'm	Coarse	Caucho
JAN.....	524	244	39	548	262	78	437	111	29
FEB.....	940	459	13	789	303	4	588	267	38
MARCH..	663	247	63	362	174	22	889	340	79
APRIL...	646	197	100	406	132	62	1,129	405	117
MAY.....	603	191	93	499	171	47	1,233	425	163
JUNE...	288	110	26	324	260	32	1,197	275	157
JULY...	198	111	102	380	173	74	1,015	213	185
AUG.....	320	88	67	575	207	104	760	94	148
SEPT....	688	246	23	764	284	109	684	56	62
OCT.....	1,124	358	99	1,246	359	115	562	55	46
NOV....	624	284	28	717	299	63	469	40	11
DEC....	1,161	394	76	937	349	50	693	85	37
	7,779	2,929	729	7,547	2,973	760			

A Pleasant Surprise for a Manager.

ON the Saturday morning following Christmas day an event took place in the Boston store of the Hodgman Rubber Co., which enlivened somewhat the seeming dullness of the day following, as compared with the bustle of the one preceding the great festival, in this well-known house. The manager, Mr. H. C. Noyes had scarcely put in an appearance when a scheme was quickly started and as quickly carried out, by the employés of the house, which gave that gentleman a genuine but pleasant surprise. Two of their number were delegated to visit an art store, nearby, where they procured an elegant imported bronze parlor-lamp, set on a Japanese vase of unique design. This, while Mr. Noyes' attention was cleverly diverted, was carried into his office and placed upon a chair beside his desk, along with a card suitably inscribed, containing the names of the donors. When Mr. Noyes returned to his desk his surprise was as complete as the gift was unexpected. He quickly recovered, however, and thanked the givers in a brief speech, which was warmly applauded. The lamp remained on exhibition in the office during the day, and was greatly admired by all who saw it.

Reciprocity with the British West Indies.

THE latest reciprocity arrangement concluded by the United States under Section 3 of the Tariff Law of 1890 is with the British West Indies, embracing Jamaica, Barbadoes, British Guiana, Trinidad, and the British Leeward and Windward Islands, except Grenada. It is expected that the arrangement will go into effect with the West Indies on February 1, and with British Guiana on March 31. Our rubber-goods trade with these countries has been very small, so far, the figures below representing the exports in this line for the fiscal year ending June 30, 1890:

	Value.
Boots and shoes.....	\$ 504
All other rubber-goods.....	7,054
Total	\$7,558

It is possible that this trade is capable of extension. The total value of domestic merchandise exported from the United States to the countries named amounted during the same year to \$9,290,974 in value. If the effect of the free admission of West Indian products to American markets shall be to increase the extent of trade generally, a wider market for manufactures of India-rubber may follow. The concession made in favor of our rubber-goods, by the way, is that they shall be admitted hereafter to these islands "free of all custom duty and any other national, colonial or municipal charges."

A Salesman's Experience with Packing.

"I NEVER try to argue with a buyer of packing," remarked a salesman recently. "In fact, until I know exactly what a man wants I lie low and let him do the talking, and I have learned this by long experience. For example, I go into one big manufactory and talk packing and the proprietor says: 'Now look here, I think that soapstone is the best that any man can use. It satisfies me to a T. Don't you think so?' Of course I say 'yes' and sell him all the soapstone I can. But in the next mill if I go in and remark, 'I suppose you want some of that soapstone packing,' the proprietor will say: 'Soapstone be hanged! I don't find anything equal to asbestos packing and you must know that that is the best, don't you?' Natur-

ally I say I do. The third customer will insist that gum-core packing is the best while the fourth will insist on having plum-bago packing and nothing else. And so it goes. I suppose the truth is that all of these packings are excellent in their places, and that ordinary engineers know how to use one kind of packing and fail on another, the fault lying with their ignorance, rather than in any defect of the goods."

A Model Rubber Factory.

IT is not probable that rubber-men generally, either East or West, appreciate the extent of the rubber business in the city of Cleveland, Ohio. The Cleveland Rubber Co. have a mill that for size and equipment is a marvel. The plant as it stands to-day is capable of turning out an immense quantity of goods, and is to be still further increased. In visiting it one naturally looks first at the boiler-rooms, where are set a Hazelton boiler of 500 horse-power and a battery of four horizontal boilers of 550 horse-power. All of these are fired by the Murphy stoker, a Detroit invention. In the engine-rooms are a Rollins engine of 300 horse-power and another built by Russell & Co., of Massillon, Ohio. Near to this is a Hughes steam-pump of 500 gallons capacity, while foundations are now being laid for a second pump built by the Gordon Co., which will throw 1000 gallons a minute. Here too are the dynamos that furnish the electric lights for the whole plant. In the grinding-rooms are set thirty-six mills and seven calenders which are kept busy from one year's end to the other. A completely-equipped machine-shop and carpenter-shop are attached to the main plant, so that the company not only make their own molds, but also make boxes for shipping and do all repair work about the place. This plant already described might well be called a model were it not for the fact that a new factory building is almost completed that far outshines it, so perfect is it in its equipments.

The main building of this addition is 150x42 feet and three stories in height. The ground floor is to be devoted to mold-work and will contain ten hydraulic presses built by the Variety Iron Works of Cleveland. A floor in a wing of this building will be filled with vulcanizers big and little and has every convenience for the rapid handling of the molds. On this floor is also the wringer-roll room. On the second floor is the tubing, gasket, and jar-ring room. This will be fitted with the latest machines and appliances for turning out these goods. The whole apartment is flooded with light from the nine-foot windows, and has a seven-inch floor with a maple covering, which not only allows of heavy work, but is a means of fire protection. The third floor is devoted to the making up of druggists' sundries, and is crowned by a glass bleachery for finishing the goods. Elevators run to the top story, and on every floor is the Smead Dry-Closet System, which is something that few mills have ever been progressive enough to adopt. Electric lights, new machines, the best and most solid construction are features of this mill, and it deserves the name that the Cleveland people have given it—a model rubber mill.

A STATIONER in Philadelphia reports the sale of an unusual number of rubber erasers just before Christmas. Said he: "You see people must rub the price marks off the holiday gifts, and rubber is rarely found around a house after once using."

THE English papers are printing this as a specimen of an American joke: "Why does a policeman sometimes wear rubber boots?" "To insulate the 'copper.'"

TRADE AND PERSONAL NOTES.

THE partnership existing under the style of Charles Loewenthal & Co., expired by limitation on December 31, and a new partnership has been formed under the style of Reimers & Meyer, who will take over all the assets of the late firm and will assume its liabilities. Their New York address will be, as heretofore, No. 67 Pine street, and their Boston address No. 150 Franklin street. It is announced that Heilbut, Symons & Co., of London and Liverpool, are special partners in the firm, contributing \$100,000, and Charles Loewenthal, who retires from active business, also becomes a special partner, contributing a like amount. Mr. Reimers, one of the succeeding members of the firm, will remain in Boston, having the care of the interests of the company there. He has been with the company for fifteen years. Mr. Meyer was with Heilbut, Symons & Co., in London, for eight years and for the last six years with the firm of Charles Loewenthal & Co., in New York. Both are very active and popular men, and with their long experience it is not expected that there will hardly be a ripple denoting a change in the affairs of this substantial house. Mr. Charles Loewenthal has been in New York connected with the affairs of the company which has borne his name for twenty-seven years. The cares of the large business which he has transacted in that time have left a very slight impress upon him, but he has earned an ample fortune and he thinks an indefinite vacation and after a few weeks will visit Europe on a pleasure trip. Mr. F. Poel and the rest of the staff will retain their accustomed places.

—Clark & Co., of Jamestown, N. Y., who are the leading hardware and supply men in their place, are doing a fine business and have occupied their new store about six months.

—Bovard & Seyfang, of Bradford, Pa., have just incorporated their concern, and have fitted up a new and large store with general supplies.

—It perhaps is not generally known that the Rev. George H. Gutterson, who is making such successful appeals for money for missions in India, was a former employé of the Tyer Rubber Co., Andover, Mass. The fact that he was formerly a rubberman accounts for his phenomenal success.

—One year ago Callahan & Douglas established a supply store in Binghamton, N. Y., and to-day they have an excellent trade, which means not only pluck and endurance, but an unusual amount of "hustle."

—Barker, Rose & Gray, of Elmira, N. Y., have now occupied the new store, which they built for their own needs, about six months, and although the quarters were commodious they have none too much room for their present trade.

—E. A. Mason, of Pittsburgh, Pa., has just returned from a trip to New York and Boston, where he has a deserved reputation of being a bright and energetic business man.

—A gentleman whom all the commercial travellers have a good word for is Mr. Neal, the buyer of Weed & Co., Buffalo, N. Y.

—Mr. Garlock, of rubber-packing fame, has recently erected a fine residence in Palmyra, N. Y., where his factory is situated.

—Walbridge and Co., of Buffalo, N. Y., who were burned out a year ago, have gone into a new seven-story house and have, without doubt, one of the finest wholesale and retail hardware stores in New York State, and withal an excellent rubber trade.

—R. Hoffield & Co., of Buffalo, N. Y., who have a large supply trade, are manufacturing a leather-belt of their own, are advertising it widely and getting a good business with it.

—Mr. Stowell, of the firm of Babcock & Stowell, Binghamton, N. Y., had a serious time with the "grip," but now comes up smiling and is able to drive out behind Mr. Babcock's fast horses with his old-time enjoyment.

—The Syracuse Supply Co., of Syracuse, N. Y., have recently moved into a fine new store which the "boys" say is the best on the line of the New York Central railroad.

—A big Christmas trade is what Frank Howlett, of Syracuse, N. Y., managed to secure for his rubber store.

—Mr. Fowler, of the Hamilton-Matthews Co., of Rochester, N. Y., was recently in New York City and spoke of an excellent season's work and a good outlook for future business.

—A very large mill-supply trade, particularly in mill-hose and general mechanical goods, has been secured by Chamberlain's rubber store in Rochester, N. Y.

—C. S. Knowles, of No. 7 Arch street, Boston, has gone to Bermuda for a brief winter vacation.

—J. E. Larrabee, of Amsterdam, N. Y., has moved into a new store which is by all odds the best in town, and has greatly enlarged his stock of general supplies.

—The Eastern Electrical Co., No. 65 Oliver street, Boston, have issued a calendar that is sure to attract attention. The block of dates is set on a rectangular piece of white metal plated with aluminum, the name of the company being in raised letters on the face of the plate. It is a very bright and tasteful piece of work and an attractive form of advertising.

—Mr. J. B. Raddell, of Utica, N. Y., is glad to be able to state that as '91 closes he can look back and see a year of the best trade he has ever enjoyed.

—Mr. Thomas A. Little, of Wheeling, W. Va., who is well-known to the general supply-trade, is the inventor of a gas-stove in which he is now doing a profitable business.

—The Ideal Manufacturing Co., of Detroit, Mich., are placing larger orders for hose-reels this season than in any previous season in their history.

—Mr. John S. Damrell, the Boston Inspector of Buildings and ex-Chief of the Boston Fire Department, gives the Thurston reel the highest sort of praise and recommends that it be used in private houses and manufactories in preference to all other reels.

—President Horace H. Tyer, of the Tyer Rubber Co., is down with the "grip" and has been very ill.

—Mr. Clark Witbeck, of Schenectady, N. Y., is sending out numbers of travelling salesmen and getting an exceedingly good trade. He does a great deal for the Edison company, whose works are situated in his city.

—Mr. F. D. Hamilton, who travels through New York, Pennsylvania and West Virginia for the Boston Woven Hose and Rubber Co., takes in the State of Ohio this year as an addition to his territory.

—The Crandall Packing Co., of Palmyra, N. Y., have now been three months in their new factory, and business is "booming" with them.

—The Pennsylvania Supply Co., of Wilkesbarre, Pa., have just moved into new quarters, a fine new block having been built for their occupancy.

—A firm who do a tremendous supply business and who have travellers all over the United States, and who are withal one of the old established and wealthy concerns, are Homer Foote & Co., of Springfield, Mass.

—The Chicago Packing Co. have moved their business from

St. Louis to Buffalo, N. Y., have put up a new factory in a suburb called Black Rock, and are prepared to do a large business in their specialties.

—Mention was made last month of the marriage of Capt. Harry E. Converse, son of Treasurer E. S. Converse, of the Boston Rubber Shoe Co., and the daughter of Mr. John H. Parker, at Malden, Mass. Their wedding journey embraced a visit to Chicago, where they were tendered a reception at the residence of Mr. George P. Holmes, of George P. Holmes & Co., Western agents for the Boston Rubber Shoe Co. Mr. and Mrs. Converse spent several days at Lakewood, N. J., before returning home.

—George A. Alden, the Boston rubber-man, was one of the largest owners of the Hotel Wellesley, which was burned December 18. Fortunately the hotel was well insured, and it is hoped that it will be rebuilt in time for next summer's business.

—The American Rubber Co. have sent M. V. D. Thompson to Australia to extend their trade in that direction.

—H. A. De Windt, head of the rubber department in the shoe-house of C. H. Fargo & Co., Chicago, severed his connection with that house on January 1.

—It is stated that W. L. Sage & Co., of Boston, bought recently 42,000 cases of the Excelsior Rubber Co.'s goods, including arctics, snow-excluders, sandals and croquets. It is estimated that 112 railroad cars would be needed to ship this lot at one time. A very few years ago a single order of only 5000 cases of rubbers would have been considered very large.

—The Boomer & Boschert Press Co., of Syracuse, N. Y., are making for H. O. Canfield, Bridgeport, Conn., three steam presses, 21x25 inches, three plates to each press. Also, for Edward M. Taylor, Wilmington, Del., one press, 24x66 inches. They filled an order recently for the Gutta-percha and Rubber Manufacturing Co., of Toronto, Ontario.

—The National India-Rubber Co., of Bristol, R. I., are marketing a fine grade of insulated wire, rubber-covered, which is known as the "N. I. R.," and is very favorably spoken of by purchasers.

—Mr. Charles E. Gibbs, in spite of two removals and a fire, has established a first-class business at No. 6 Beverly street, Boston, in the making of molds for the rubber trade.

—The Boston Woven Hose and Rubber Co. are so busy on orders for belting and hose that they are running their factory twenty-four hours a day.

—Mr. Alfred W. Fitz, treasurer of the Chelsea Wire Fabric Rubber Co., went West before the holidays and found so much business in sight that he was not able to get home to Boston for Christmas.

—The Cornelius Callahan Co., the well-known fire-hose manufacturers, have recently made a change in their management. Mr. Callahan has retired and gone South for his health, while Mr. George S. Willis, formerly the chief of the Pittsfield Fire Department, has been made secretary and treasurer, and Mr. Walter Cutting, president.

—Mr. Henry F. Knowles is now sole New England agent for the Globe Rubber Co., of Trenton, N. J. He has taken a large store at No. 49 Federal street, Boston, and is rapidly fitting it up and putting in a large stock of mechanical goods. Mr. Henry M. Clarke, who has been with Mr. Knowles for a number of years and who is well-known to the trade in Boston and vicinity, has also been secured by the Globe company to attend to New England trade.

—Mr. J. H. Parker, the inventor of the well-known Mystic Hose Pipe and who was for thirteen years with E. B. Preston, of Chicago, is now with C. S. Knowles, Boston.

—Mr. Herbert H. Eustis, president of the Eastern Electric

Cable Co., of Boston, is the latest rubber-man we have heard of who has become a Benedict.

—J. I. Case, the wealthy manufacturer and horse-breeder of Racine, Wis., who died recently, was a very heavy stockholder in the Chicago Rubber Clothing Co., the plant of which is situated in Racine. Indeed, Mr. Case was one of the incorporators of the company and one of the prominent movers in getting it started.

—The Candee Rubber Co., it is said, before the holidays, issued orders that no subscriptions for Christmas presents should be taken up in the shop and that foremen and forewomen should not receive presents from subordinates.

—C. J. Bailey's rubber heel-cushions are meeting with a good demand for export trade.

—The Massachusetts Rubber Co., of Reading, Mass., through Charles W. Hatch, manager, assigned December 19th to George R. Fowler. Eighty-five persons are thrown out of employment, and the weekly distribution of \$1000 in wages is lost to the town. The plant is said to be in good condition, and it is thought that the company may be able to resume. The reported cause of the failure was the lack of working capital, only \$50,000 of the authorized capital of \$250,000 having been paid in. Mr. Hatch also made an individual assignment. The creditors have chosen E. H. Clapp, H. Reimers and George L. Clark as a committee to examine the affairs of the company.

—Two boot-and-shoe houses in Boston were damaged by fire on December 20th to the estimated extent of \$600,000. They were Hosmer, Coddling & Co., and Parker, Holmes & Co. Both firms lost heavy stocks of rubbers.

—A neat little sprig from a Christmas tree, tied with a red ribbon, with a diminutive cornucopia hanging from the end, was the holiday reminder that the Mason Regulator Co. sent to their various customers. Mr. Chase, the treasurer of the company, is certainly a genius in getting up attractive advertisements. One of his latest fads, and one that bids for considerable attention, is a business envelope that is a *fac simile* of the German style, with the name of the concern printed in brush letters across the upper part.

—The Elastic Tip Co., of Boston, Mass., moved their office on the first of January from the corner of Cornhill and Washington streets to No. 370 Atlantic avenue. They have already quite a plant on Atlantic avenue for the manufacture of the rubber-tipped arrow, and while they give up their up-town office, the store for the sale of rubber goods will still be retained.

—Charles H. Brown, proprietor of the engine works in Fitchburg, Mass., has gone to Florida to spend the winter.

—The Metropolitan Air Goods Co., a Portland (Maine) corporation, have opened an office in Boston, where they advertise the sale of air-mattresses and cushions made of fabric lined with rubber.

—Mr. Henry C. Noyes, manager of the Hodgman Rubber Co., Boston, Mass., evidently has made himself solid with the editors of the West Roxbury News, one of Boston's suburban newspapers, for almost every week the Hodgman mackintoshes receive a first-class send off.

—F. C. Hood, secretary of the Boston Rubber Co., has been under the weather with a touch of the grip recently. He is, however, out again and about his usual duties.

—Mr. George Barney, of the Barney Ventilating Fan Co., of Boston, recently was driven into a corner by an advertising man and forced to give the particulars for a "write up." Imagine his disgust when the article appeared embodying the statement that none of the Barney Fans had ever been returned for *efficiency*!

—The Washburn & Moen Manufacturing Co., of Worcester, Mass., are putting in a plant for insulating wire. That it is to be rubber wire is proved by the fact that they have purchased grinders and calenders, and that it will be good wire the reputation of the firm leaves no doubt.

—The Goodyear Gossamer Co., of Hudson, Mass., have equipped their factory with an Eco-Magneto clock, which, by the way, seems to be the popular watchman's clock among rubber-manufacturers.

—Mr. William Yerdon, whose hose band has attained such remarkable popularity, is postmaster of the town of Fort Plain, N. Y., runs a profitable stage-route and has caught the rubber trade so with his last invention that he is selling his goods in 500-gross lots.

—A firm of chemical engineers, who are devoting especial attention to expert work in the rubber business, are Davenport & Williams, No. 161 Tremont street, Boston, Mass. It is remarkable that more experts in industrial chemistry have not gone into the rubber business, and it is to be hoped that these gentlemen will receive solid assurance that their move is a wise one.

—J. Francis Hayward, Boston, has given up his store at No. 130 Congress street, and may hereafter be found at the office of the Cable Rubber Co., No. 28 Essex street, of which company he is the treasurer.

—Mr. Warren Hill, president of the Standard Rubber Co., Boston, recently made one of the largest scores in bowling with the regulation balls and pins at the Boston Athletic Association that has been made in a long time.

—Now that Stephen B. Elkins is brought into such political prominence, it is interesting to remember that one of the popular rubber-men, Mr. Oliphant, is the son-in-law of Mr. Elkins.

—The newspaper report that the Hon. E. S. Converse presented his son, Harry, with a check for \$1,000,000 as a wedding present is contradicted. No one, however, has the temerity to contradict the assertion that Mr. Converse is perfectly able to furnish that sum or much more if he should see fit.

—The Peerless Rubber Manufacturing Co., of New Durham, N. J., are contemplating seriously a further enlargement of their plant, as they find it hard work to fill their orders.

—Mr. Ayers, of the Duplex Rubber Co., New York, has taken the agency for the Hope metallic packing, and is selling a great deal of it.

—Mr. Samuel K. Wilson, proprietor of the Globe Rubber Works, Trenton, N. J., is the largest individual manufacturer of woollens in the United States. He is also practically the owner of the new electric road in Trenton, N. J.

—Mr. Moseley, a wealthy English rubber-manufacturer, is over here on a brief visit, his headquarters for the time being Providence, R. I.

—The New England Fire and Heat Regulator Co., of Boston, have lately received orders from five different rubber-plants for their heat-regulating device for vulcanizers.

—In spite of the fact that a chemist's knowledge is of such great value to the rubber-manufacturer, it is said that only one concern in the United States has its own chemist, and that is the Boston Rubber Shoe Co.

—Mr. B. T. Morrison, treasurer of the Reading Rubber Manufacturing Co., is just back from a flying trip through the West.

—The Elastic Tip Co., Boston, manufacturers of the rubber-tipped arrow, have a very striking advertisement in the shape of a large Christmas tree on wheels, which is driven about the streets of Boston. The tree is decorated with the handsome targets that go with this popular game and is very effective.

—Buyers of rubber clothing the country over have recently been receiving an envelope that is an exact *fac simile* of those in which the telegrams of the Western Union Telegraph Co. are sent. Inside, printed on paper that looks for all the world like a *bona fide* message, is this terse sentence: "We want your trade. Very respectfully, The Reading Rubber Manufacturing Co." Above this and across the top is the heading: "Vulcanized Rubber Clothing, Dress Shields, Fine Mackintoshes a Specialty." It must be good advertising, for whoever received it surely opened it, and every man who opened it read it.

—If the Star Rubber Plant in Trenton is sold entire, there will be a decided "boom" in the manufacture of rubber-machinery, for numbers of mechanical-goods manufacturers are ready to buy belt-presses, tubing-machines and grinders, and if they cannot get good second-hand machines, they will have to buy new ones.

—The products of the Cleveland (Ohio) Rubber Co., which have long had a good standing west of the Alleghenies, are now being introduced in the Eastern and New England States. Arrangements have been made for supplying their "Shield" high-grade belting and seamless-tube hose through the Page Belting Co., No. 16 Dey street, New York, and No. 17 Federal street, Boston, and C. W. Army & Son, Nos. 228-230 North Third street, Philadelphia.

—The New York Belting and Packing Co. (Limited), No. 15 Park Row, New York, are distributing among their friends and the trade a very neat and convenient six-inch vest-pocket rule. It bears upon one side the name of the firm and calls attention to their vulcanized rubber belting, packing and hose, and vulcanite emery-wheels.

—The Stephen Ballard Rubber Co. (New York) observed New Year's day by mailing to the trade a handsome calendar for 1892 of convenient size for placing upon an office desk, to remind one permanently of the mechanical rubber goods made by this firm.

—A certificate of incorporation has been filed by the Essex Rubber Co., of Newark, N. J., who propose manufacturing rubber and metal goods on a capital of \$10,000. The incorporators are Harry J. Yatman and J. W. Dickenson, of Newark; John H. Fargis and Joseph A. Arnold, of New York, and Edson Pearsall, of Brooklyn.

—The Cleveland (Ohio) Novelty Co. have in the past six months doubled the output of their goods and gone into a larger and more fully furnished factory.

—Mr. Albert T. Holt, of the B. F. Goodrich Rubber Co., of Akron, Ohio, is down with a severe attack of the grip.

—The Lorain Manufacturing Co., of Cleveland, Ohio, whose couplings are so well known to the trade, are so full of orders that they are puzzled to fill them. The season opening thus early for them augurs well for the year's trade.

—The W. H. H. Peck Co., of Cleveland, Ohio, have a handsome store on Superior street, where three floors are devoted to the sale of rubber goods. They also have an equally commodious three-floor warehouse on Water street in the same city.

—Mr. Hoover, secretary and treasurer of the Western Linoleum Co., Akron, Ohio, reports that they are so snowed under with orders that he had to buy a pair of gum boots to wade through them.

—The Mattson Rubber Co. are about to place upon the market a corset shield for the protection of the waist against broken stays in that article of dress. They are similar to the dress shields, made oval in form and five, six and seven inches in length, coming in pairs. The company in view of their increasing business find it necessary to put in some new large washers

and make some other additions to their plant. Calendering with them now is coming in freely, and a large amount of it is expected this season.

—The friends of H. S. Randall, the New York manager of the Boston Rubber Shoe Co. will be glad to learn of the improved chances for his recovery. Mr. Randall was taken violently ill with pneumonia, and for several days his life was despaired of.

—In a mention of the Imperial Rubber Co. in the last issue of this journal, Mr. George E. Austin was referred to as having been connected with the "Columbia" Rubber Co. The Commonwealth Rubber Co. should have been mentioned, instead.

—It seems that natural gas is not the best fuel for rubber manufacture. A mill that was situated in the gas-belt and that congratulated itself on its cheap fuel, found that its goods deteriorated rapidly, and had to be handled very differently from those cured by the heat derived from coal. It is probable that the trouble was caused by the constant presence of the gas in and about the mill, rather than from any difference in the curing heat.

—E. R. Barber, of Portland, Maine, who owns a large supply-house there, is known far and wide not only as an enterprising business man but also as an inveterate practical joker. If only the rubber-salesmen could be induced to confess there would be on record many an interesting story at their expense, all done in the best of good nature, however.

—Mr. Charles E. Stokes, one of the stockholders in the Home Rubber Co., who may be said to have grown up in the rubber business, has taken the superintendency of the Home Rubber Co. factories in Trenton.

—Mr. W. J. Staples, of the American Steam Packing Co., is out in Michigan on a business trip for his house.

—The Hastings accident on the New York Central and Hudson River Railroad would never have happened if brakeman Herrick had carried a sensible little alarm that belongs to a well-known rubber-man. Mr. Parker, with C. S. Knowles, in Boston, is the rubber-man in question, and can give further information to those interested.

—The Home Rubber Co. have added two new vulcanizers to their plant, one for curing gaskets, the other for tubing. The company are booking large orders, and look for a big business in 1892.

—Commercial travellers award Mr. Peters, of J. A. Treat & Co., Lawrence, Mass., the palm for possessing the most retentive memory. Prices once quoted to him in his capacity as buyer never are forgotten.

—In the great fire in Haverhill, Mass., about a year ago, the firm of C. H. Fellows & Co. were burned out. They rebuilt on the old site, and during the last twelve months have doubled the volume of their business.

—The Grapha Belt Dressing, which is the invention of Samuel Kidder, of Boston, has found its way into nearly all the supply-stores in the country.

—The Western Iron and Supply Co., of St. Louis, is the name of a new concern that starts off this new year under most favorable auspices. Mr. N. C. Durie, formerly with Ripley & Bronson, of that city, is one of the incorporators. The good wishes of the rubber trade go with Mr. Durie in his new home.

—The Simmons Hardware Co., of St. Louis, have probably one of the largest supply-houses in the world. They employ over a hundred travelling men and cover the whole country. They are agents of the Boston Belting Co.

—John Hopewell, Jr., President of the Reading Rubber Manufacturing Co., of Reading, Mass., has been quite ill with the grip, but is now convalescing rapidly.

—Mr. S. Reineman is a new travelling man for the Home

Rubber Co., and makes his bow to the Western trade as we go to press.

—The Frederick Taylor Co., of Lowell, Mass., have been succeeded by the Thompson Hardware Co. Mr. Thompson, the head of the firm, was formerly with H. O. Shattuch, of that city. The new firm employ a number of travelling men.

—One of the best known and richest supply-houses in New England is that of Trafton & Anthony, of Fall River, Mass. From the beginning of their business, which dates back many years, one of their inflexible rules in buying has been to pay cash in ten days. In consequence of this policy their trade is eagerly sought.

—The swell set in Newport, R. I., buy their garden-hose and supplies of George A. Weaver, of that city. It is needless to add that the best is none too good for him and price is no consideration.

—The largest supply-house in Rhode Island is that of Belden & Loomis, of Providence. They have recently moved into a large and handsomely equipped building erected purposely for them.

—It is worth considerable to have the reputation of being an authority on matters pertaining to the business one follows. Howard M. Waite, of Worcester, Mass., enjoys that enviable distinction in the hardware and supply trade.

TRADE PUBLICATIONS.

THE Elastic Tip Co. (Boston) issue a catalogue of rubber goods and specialties of which they are patentees and manufacturers. Chief among these are the elastic chair-tips described more fully in the department of "New Goods in the Market" this month. There are also illustrated in this catalogue hard-rubber bicycle-handles, bicycle-tires, pedal rubber, rubber truck-wheels, druggists' sundries and a lawn and parlor game, which includes a harmless pistol, with vacuum-tipped arrow.

—The feature of interest to rubber-men in the catalogue of the Tuerk Water-Meter Co. (Fulton, N. Y.) is the band clamp for hose coupling manufactured by that company. This device is also described in "New Goods in the Market."

—The Reading Rubber Manufacturing Co. (Boston) send us a catalogue of rubber clothing manufactured by them, with illustrations of the leading styles, and instructions for self-measurement for persons ordering from a distance. The manufacturers assert that the popular opinion respecting the superiority of foreign-made rubber garments is untrue, but that on the contrary better goods are made in America. They make also dress-shields and bustles and invite the trade to send requests for prices and samples of any of their goods.

—Rubber-men having any need of metallic thermometers for factory use may be interested in Catalogue No. 26 published by the Standard Thermometer Co. (Peabody, Mass., Boston and New York). A specialty is made of standard dial thermometers, and some introductory pages are devoted to their advantages over the mercury column instruments.

—The Lorain Manufacturing Co. (Cleveland, Ohio) advise THE INDIA RUBBER WORLD that they have in press a new catalogue of hose goods, which they will be pleased to send gratis to any applicant.

—A new edition of the descriptive price-list of asbestos materials manufactured by the W. H. Johns Manufacturing Co. (New York) has been received. Among the articles described is "asbestos-and-rubber cloth," recommended as forming a perfect joint, steam- acid- and air-tight; also asbestos-and-rubber tape and rings.

REVIEW OF THE RUBBER MARKET.

THE market for Pará rubber within the past thirty days has been dull with slight variations, about two cents being the limit of fluctuations. The consumers in the market are the mechanical-goods men and the sales to bicycle-makers have been a feature. The arrivals at New York during the month of December were the largest of the year, aggregating 1631 tons, with deliveries only exceeded by one month, that of October. Stocks are consequently large, and this is probably the reason for the steadiness of the market. Boot-and-shoe men are buying little at present and will probably not come into the market for some weeks.

Fine Pará has sold as high as 64 and below 62 cents possibly, but this unimportant range denotes the extreme in the fluctuations. In Africans the trade has been dull. Some prime Assams have sold at 53½ cents, with No. 2 at 33 cents. The trade in Africans is generally dull at this season, and this year is no exception to the rule. In Centrals, the demand has been good with free arrivals aggregating 313,000 pounds in the month of December, all of which have been absorbed by the trade. There have been good sales of Tunos at 16 cents, but the remainder of the stock has been held at 20 cents.

At Pará the receipts during the month of December were 2690 tons against 2100 tons one year ago. Late cables quote 4450 @ 4500 for up-river, with exchange at 12½. The arrivals at Pará so far in January are 570 tons, an average quantity.

The arrivals at New York from Pará during the past thirty days have been as follows:

	Pará.	Caucho.
December 14—By the <i>Advance</i>	187,500 pounds.	11,500 pounds.
December 22—By the <i>Basil</i>	987,100 pounds.	24,400 pounds.
December 23—By the <i>Finance</i>	253,200 pounds.	
December 29—By the <i>Cyril</i>	689,400 pounds.	29,200 pounds.
January 6—By the <i>Seguransa</i>	273,800 pounds.	6,100 pounds.
January 7—By the <i>Amazonese</i>	537,800 pounds.	47,500 pounds.
Total.....	2,928,800 pounds.	118,700 pounds.

The stock in New York of Pará on January 1 was 693 tons fine Pará, 85 tons coarse, and 37 tons Caucho.

The whole visible supply of Pará rubber on January 1, with comparisons for December 1, is estimated as follows:

	December 1, 1891.	January 1, 1892.
United States.....	491 tons.	778 tons.
England.....	525 tons.	485 tons.
Pará.....	1010 tons.	1345 tons.
Afloat to United States.....	700 tons.	390 tons.
Afloat to England.....	325 tons.	540 tons.
Total.....	3051 tons.	3538 tons.

The visible supply on January 1, 1891, was 3477 tons. The deliveries in the United States during December were 1349 tons and in Europe 650 tons, an amount only equaled once before in any one month.

The statistical position of Pará rubber in New York is thus reported for December, 1891, as compared with the same month in preceding years:

STATISTICS OF PARÁ RUBBER.

Stock of Pará here	November 30, 1891,	about	1,125,000 pounds.
Receipts	December	"	3,255,000 pounds.
Deliveries	December	"	3,080,000 pounds.
Stock	December 31, 1891,	"	1,300,000 pounds.
Stock	December 31, 1890,	"	1,500,000 pounds.
Stock	December 31, 1889,	"	775,000 pounds.

Prices for December.

	1891.		1890.		1889.	
	Fine.	Coarse.	Fine.	Coarse.	Fine.	Coarse.
First.....	65	48	72	50	73	55
Highest....	65	48	78	55	73	55
Lowest....	63	43	67	44	73	55
Last.....	63	43	77	55	73	55

Mail advices from Liverpool report the sales of Pará during December at 631 tons and arrivals at 605 tons, with a net stock at the end of the month of 419 tons against 734 tons at the same time in 1890 and 332 tons in 1889. Prices had moved within a narrow range during the month, with 2s. 9d. the nearest value. Ceará had sold as high as 1s. 9½d. and down to 11d.; Mangabeira, only a small quantity sold at 1s. 5½d.; Peruvian slabs and strips 1s. 9d @ 1s. 10d., the business being of a retail character. Africans had been in good demand with sales of 200 tons. Total stocks at the end of the month were 636 tons, with quotations as follows:

Gambia.....	1s. 2 d. @ 2s. 8 d.
Sierra Leone Niggers.....	11½d. @ 1s. 9½d.
Thimbles.....	1s. 8½d. @ 1s. 9 d.
Accra.....	1s. 0 d. @ 1s. 10½d.
Congo Ball.....	1s. 7 d. @ 1s. 8 d.
Tongues.....	1s. 3 d. @ 1s. 6 d.
Salt Pond.....	1s. 0½d. @ 1s. 8 d.
Libealan.....	1s. 0 d. @ 1s. 3 d.
Lumps and flakes.....	1s. @ 1s. 1 d.

Late cables from London report no change in the quotation of 2s. 9½d. for fine Pará.

The latest New York quotations are:

Pará, fine, new.....	64-65	Sierra Leone.....	26-42
Pará, fine, old.....	68-70	Benguela.....	47-48
Pará, coarse, new.....	44-48	Congo Ball.....	—
Pará, coarse, old.....	48-50	Small Ball.....	—
Caucho (Peruvian) strip.....	45-46	Flake, Lump and Ord.....	24-26
Caucho (Peruvian) ball.....	52-53	Mozambique, red ball.....	—
Mangabeira, sheet.....	37-38	Mozambique, white ball.....	—
Esmeralda, sausage.....	47-49	Madagascar, pinky.....	51-52
Guayaquil, strip.....	38-39	Madagascar, black.....	35-42
Nicaragua, scrap.....	46-48	Borneo.....	30-41
Nicaragua, sheet.....	44-46	Gutta-percha, fine grade.....	140 @ 150
Guatemala, sheet.....	40-45	Gutta-percha, medium.....	100
Thimbles.....	42-43	Gutta-percha, hard white.....	100
Tongues.....	36-38	Gutta-percha, lower sorts.....	60-83

The rubber-goods trade has been occupied largely, since the beginning of the year, in inventory-making and in planning the business of the coming season. Since our last issue, therefore, the trade in many of its branches has been almost without incident, and the volume of transactions has reached the lowest figure for any month of the year. Travelling men are getting instructions and packing up their samples for a new crusade. While they are refraining from trying to force sales, the country merchants are at home, not coming in to buy.

Boots and shoes during the past month have been dull with one striking peculiarity. There has been a call for wool-lined goods that has practically exhausted the supply, and this call within the past few days has been more urgent. The unseasonable weather of the past year has discouraged the production of these goods, and manufacturers have been inclined to adopt the custom of making up these goods after the orders have been in hand. One company which during last year had accumulated a stock of 1200 cases which lay dormant for a long time, has lately seen with some surprise all of them except a few cases of almost unreasonable sizes pass out of their hands, and realized at the last moment the demand that had almost imperceptibly been going on which absorbed this lot. It is a class of goods which by reason of labor and the small supply of lasts usually carried in its line, is not readily replenished, and the probability is that many orders will be turned down as spring approaches. In the ordinary lines there have been some countermands, but the

change in the weather since the opening of the new year has inspired renewed confidence, and one or two outside buyers have appeared on the scene with good-sized orders. City jobbers have begun to buy freely, and the trade is putting on an appearance of animation. The auction sale of the stock of the Pará Rubber Co. last month was in the main satisfactory, 13,000 cases, many of them in large sizes, and not particularly desirable, bringing very fair prices. Reports from the sections in the West which have been visited by snow are of an uniformly favorable character.

In tennis goods there is already an encouraging inquiry. All the companies are alive on this subject, and as there are many sections of this country where the tennis-shoe is yet unknown, it is believed that the maximum of this business has been by no means reached. It certainly bids fair to be a great feature in the next few months.

In clothing the month has apparently been a dull one. Mackintoshes have been very slow of sale. In other garments there has been a fair demand. Travellers near-by report some very good orders. The business of the past year is calculated by well-informed persons to be 15 per cent. below that of 1890. Although the future is dependent upon the weather, it is calculated that with a reasonable inclemency the West will double its purchases this year. The West uniformly takes cheap goods, but an improvement in this respect is now anticipated. In fishermen's goods the demand has been excellent, and in leggings for messenger boys a large business has sprung up. Dealers in cloths are now busy with new patterns, a change being demanded annually.

The clothing trade, despite its dullness, is in a very healthy condition, stocks being only medium with the jobber and the retailer. A good trade has now been started in caps, and the various accessories of a full suit of waterproof garments. Manufacturers have spent much time and patience in educating the public to the desirability of having every garment exposed to the weather made waterproof, and now their efforts are meeting with success. The aim now is to make goods cheaply so as to bring them within the range of the masses, thereby stimulating the demand.

Ice-aprons are having a good sale, butchers as well as icemen seeing the desirability of these goods. A good sale of horse covers is reported, and carriage drills have had an average demand.

In webbing a very good business was done in December, but since Christmas trade has been dull. Business is up to last year, however.

Druggists' sundries since Christmas have been dull, and but little business is expected for some time. A good trade in atomizers was had during the holidays. Travellers are now about to go out, with their lines, in which there are many novelties, and as in many sections this class of goods has been looked upon in the light of luxuries, it is presumed with the prosperity prevalent in the West, that a large sale will be had.

The toy season closed with the holidays, stocks being well cleaned up, and the season said to be a good one.

In mechanical goods the month has been dull only in comparison. It is probable that for years we never have had a season in general manufacturing like the present, and when there is added to this factor that of the unprecedented crops of grain, requiring railway transportation, elevator handling, etc., it can readily be seen that the demand must be a large one. Railroads are getting prosperous, and order freely. The factories are working double turn, on packing, belting, air-brake and steam-hose, and the list of other articles which go to make up this line.

In hard-rubber goods business has been dull, only a moderate amount of orders having been received. There was a reduction made in combs in the hope of stimulating the demand, but it seems to have had little effect as yet.

A good trade in insulated wire is being developed. An immense amount of building is being planned, and dealers are expecting a good trade in a month or two. The additions to the ranks of electrical engineers within the past six months is a sign of the activity in this department.

In regard to the financial situation Messrs. Simpson & Beers, brokers in India-rubber and other commercial paper, New York, report: "During December money has ruled easy here, especially the latter part of the month. Through all the month rubber paper was scarce. What desirable paper was obtainable was readily sold at 5½ and 6 per cent. The prospect is that paper will not be plentiful for some time to come, as manufacturers have been and are doing a very conservative business."

Rubber Scrap.

It is stated that foot-ball boots, with rubber soles, pyramided fore-parts and toe cap of molded rubber over a quarter of an inch thick at the extreme end of the toe, are a late British invention. They are said to be serviceable for the purpose for which they are made, besides which all danger of broken shins is obviated.

A NEW kind of dermatological plaster has been introduced in medical practice, the basis of which consists of purified India-rubber and anhydrous lanolin worked up together to a remarkably adhesive mass. The mixture is medicated with various substances and spread upon linen, and is then known as *Collem-plastrum*. Among the advantages claimed for this kind of plaster are its low cost; that the mass does not separate from the linen; that, while possessing the adhesive properties of India-rubber plaster and lanolin, it favors the absorption of the added medicament; and that the plaster can be readily removed without leaving portions adherent to the skin.

"INDIA-RUBBER cement is recommended for making fast glass letters and figures to windows" says *London Discovery*.

THE *Scientific American* has published, in a volume of 675 pages, edited by Albert A. Hopkins, a compilation of the "Receipts, Notes and Queries" contained in that journal for nearly fifty years past. Many "trade secrets" and formulæ of value are contained in this book, but the only reference to India-rubber and Gutta-percha are a few receipts for cement and varnish in which these articles are used.

A DESPATCH from Mexico reports the organization of a company to plant 100,000 India-rubber trees in the State of Sinaloa.

TWENTY-NINE cases of scrap rubber were included in the cargo of the Guion-line steamship *Abyssinia*, which sailed from New York for Liverpool on December 13th and was burned at sea.

PERSONS with tender feet will be interested in a new insole for boots and shoes. It is made of hollow India-rubber, inflated with air or gas under pressure, the external protective covering being canvas, silk or other similar material. Inserted in the shoe it relieves the pressure of the leather against all tender parts of the foot.—*New York Morning Journal*.

"THE INDIA RUBBER WORLD" CONSULAR REPORTS.

The Rubber Industries of all Lands Reviewed.

THE exhaustive inquiry into the India-rubber industry throughout the world, undertaken by the Department of State of the United States some time ago at the request of THE INDIA RUBBER WORLD, has resulted in the gathering of much information of value with regard to both the crude-rubber interest and the manufacture and sale of rubber goods on both hemispheres, the first statement of which we are now enabled to make public for the first time. The basis of this inquiry is the following official circular, issued to the United States Consular Service, transmitting the series of questions prepared by the editor of this journal, which questions are appended:

INDIA-RUBBER CIRCULAR.

DEPARTMENT OF STATE,
WASHINGTON, September 20, 1890.

To the Consular Officers of the United States:

GENTLEMEN:—The editor of THE INDIA RUBBER WORLD, a journal published in New York, has requested the Department to secure, through your good offices, information concerning India-rubber and the manufactures thereof. The information desired resolves into two divisions, viz.:

First. That portion of the subject relating to caoutchouc, or India-rubber, in its crude condition.

Second. The manufactures of India-rubber.

While that portion of the subject which relates to raw material is necessarily confined to a few consulates, it is of primary importance, for the reason that, while the manufactures of India-rubber are steadily increasing, there would seem to be no effort made for the conservation of the rubber forests. This destruction of the rubber tree is beginning to be the cause of uneasiness to our manufacturers for very potent reasons, and the special attention of Consuls in the rubber districts is invited hereto, and they are requested to spare no pains in their efforts to secure as full and satisfactory information as possible upon this point. It is hardly necessary to say that full and satisfactory answers are always expected from consular officers whenever the Department considers it necessary to call upon them for information, and special attention is only called to the supply of crude rubber simply because it is a phase of the subject which might not strike Consuls as being of primary importance.

The answers to this circular will be published in special form, and it is expected that the publication will cover every point of interest in the great industry under consideration, enabling our importers to be fully informed as to the supply of the crude rubber and our manufacturers to extend their trade in the markets of the world.

The attention of Consuls is again called to the rule which requires that reports intended for publication should be separate and distinct from the transmitting dispatches, and written on one side of the paper only.

I am, gentlemen, your obedient servant,

WILLIAM F. WHARTON,
Acting Secretary.

CAOUTCHOUC, OR INDIA RUBBER.

1. Is caoutchouc, or India-rubber, a product of your district?
2. Mention whether it is yielded by trees or by vines, and, where possible, procure botanical names.

3. Describe the method of conducting the business of rubber-gathering and the processes employed by the gatherers.

4. Is any American capital employed in rubber-gathering or rubber trading in the district?

5. Name the amounts of crude rubber exported from the district, and the countries to which it is consigned.

6. Mention whether there is an export duty; and, if so, give the rate and the amount of annual revenue from it.

7. Is there any fear expressed of the failure or early decrease of the natural supply of rubber?

8. Have any experiments been made in the cultivation of rubber trees, plants or vines?

9. If so, recount the successes or failures?

10. Is it believed that rubber is susceptible of cultivation, or that its culture would be profitable?

MANUFACTURES OF INDIA-RUBBER.

11. If India-rubber enters into the manufactures of your district, report fully upon the character and extent of the goods produced, specifying rubber clothing, boots and shoes, hose, belting, and other classes of goods made of rubber.

12. To what extent and to what countries are these goods exported?

13. Forward price-lists of representative manufacturers, where obtainable.

14. Is the crude rubber used imported free or subject to duty?

15. Report the extent of the importation of manufactures of rubber in your district, specifying the countries of their origin, as far as possible.

16. Give, especially, the amount and value of rubber goods imported from the United States, specifying where possible rubber clothing, boots and shoes, etc.

17. Mention whether duties are imposed upon foreign manufactures of rubber.

18. How are American rubber goods regarded in comparison with those from other countries?

19. What suggestions would you offer for the benefit of American rubber manufacturers desirous of extending their trade into your district?

It is fair to state that the Consuls did not always meet with a cordial reception in their attempts to gain information. Thus Mr. Kerbey, writing from Pará, states that his efforts to secure honest reports as Consul have served only, it would seem, to antagonize the rubber interests of Pará. He says that he is in no sense indebted to any rubber firm or to any American firm in any line of business, for the facts and figures which he has collected. The Consul-General at London reports much difficulty in securing information relative to British manufactures of rubber, which is not to be wondered at, since the object of the inquiry was the ultimate benefit of their competitors in America. These facts are mentioned only to serve to explain what might seem omissions on the part of some of the officials in their reports. The great rubber factory at St. Petersburg is able to close its secrets even against the Russian Government, so that it is not strange if an American Consul is denied information there. On the whole, however, the results doubtless are the most valuable of any ever obtained by an official investigation of a commercial or industrial subject.

The facts printed in this issue relate to the geographical distribution of the rubber tree, to all the important experiments in rubber-tree culture, to methods of gathering rubber and the extent of the production of the crude article. There is also some information of interest in reference to the probability of hitherto

unexplored sources of gutta-percha supply, both in the East Indies and in South America. In succeeding issues of this paper will be presented interesting facts relating to the rubber-manufacturing interest and suggestions for the extension of the American rubber-goods trade abroad.

THE RUBBER TREES OF THE WORLD.

THE distribution of rubber trees seems to extend over a wider area on the American continent than has heretofore been supposed. In Mexico rubber is produced to some extent in the States of Michiöcan and Colima in the consular district which includes the City of Mexico; also on the coast section of the consular districts of San Benito and Tuxpan. Practical experiments with the cultivation of rubber trees have been made also in the States of Chiapas, Vera Cruz and Sinaloa. Rubber trees grow over a large extent of Yucatan, but no rubber industry has yet been established in the latter State. The only information given in regard to the species of rubber trees is that they belong to the natural order of *Euphorbiaceæ*, which is a numerous family. It is stated that the trees grow on the lowlands, sometimes reaching a height of eighty feet and a diameter of two-and-a-half to three feet. The reports agree as to the falling off in the number of trees and the decrease in the exports of crude rubber owing to wasteful methods of rubber-gathering. It appears that no rubber trees grow and that no attempts to grow them have been made as far north in Mexico as Chihuahua.

The Consulat San José, in Costa Rica, Mr. Beckford Mackey, reports that the India-rubber from that country is extracted from the *Castilloa elastica* trees found on the coast. These trees are almost exhausted, but others are said to abound in the mountains. The Government has attempted to stop the waste of trees, but its action was so long delayed as to have resulted in little good. The amount of crude rubber exported in 1889 was valued at \$6317, being but little more than one-half the amount exported during the preceding year. All the rubber produced is exported to the United States.

A monograph of great value on "India-Rubber-Producing Vines and Trees in Nicaragua" is contributed by Mr. J. Crawfords, resident at Leon. He deals with the matter in a style very much more thorough and with greater attention to accuracy in detail than is observable in most routine consular reports. Since this report alone would fill half the space in a single number of THE INDIA RUBBER WORLD, only a brief summary can be given in the present connection. These facts have been compiled from notes made during the past three years while studying the natural history of Nicaragua.

Elastic masses of the hydrocarbon caoutchouc can be obtained from the milky emulsion caused to exude from more than twenty-five species of trees and large vines indigenous in Nicaragua. Mr. Crawfords confines his paper, however, to such species as yield a comparatively large quantity of a sap of which more than 20 per cent. can be utilized as India-rubber by the crude methods now in use.

Nicaragua has five well-defined geological divisions which are referred to and numbered from west to east. Division one, bordering on the Pacific Ocean, embraces the large cities and nearly two-thirds of the population of the country. It is well watered by streams and by numerous rains, yielding large crops of corn, sugar and numerous fruits. It contains, in differently located areas of from three to ten square miles each, in all about 500 square miles which are suitable in soil, temperature, drain-

age and atmospheric humidity for the most desirable native species of rubber trees and vines. A few tons of first-class India-rubber are gathered annually in the forests of five or six localities of this division, especially on the Peninsula of Cosiguina, and at Palacio and Marote, near the southern part of the Gulf of Fonseca.

Division two, the western side of the central mountainous part, contains a few spots aggregating 100 square miles favorable to the rubber tree, where are found several hardy, slow-growing, poor-soil loving species of *Euphorbiaceæ*, *Sapotecæ*, and *Moraceæ* which might under intelligent cultivation become desirable kinds for comparatively high land.

Division three includes the mountain ranges and elevated plains. In the narrow deep valleys between the mountains are untouched groves of the most desirable species of the India-rubber-producing trees and vines. The species are numerous and the trees large, tall and vigorous. This is the uninhabited part of Nicaragua, though it is unsurpassed by any country in the desirableness of its altitude, pleasant climate, fertile soil, water supply and freedom from malaria. Probably 300 square miles of these valleys are suited to the successful cultivation of rubber trees. A company of citizens of the United States have contracted with the Government of Nicaragua to build a railroad from the Caribbean Sea to the Pacific Ocean, which would traverse all the five divisions here referred to.

Division four is the eastern slope from the mountains to within seventy miles of the eastern sea-coast, including about 1000 square miles well adapted to the growth of rubber trees. This division is sparsely settled by Indians in small villages, located on creeks. Less than twenty years ago there were extensive groves of rubber-producing trees here, some as large as three-and-one-half feet in diameter and sixty feet high or more. Nearly all the large and medium-sized trees have been destroyed (1) by collectors who cut down the trees in order to secure as large a quantity of rubber as possible at one time; (2) by the making of too deep and rough incisions, cutting into the woody fiber and killing the trees, and (3) by insects, especially a species of beetles, the *Acosymus longimanus*, which laid their eggs in the ragged edges of the deep incisions, the grubs eating into and destroying the trees. The Government enforces no control over the lands, though they still form a part of the public domain. Whoever first arrives in a rubber forest for the sake of gathering gum claims that locality for the season, usually with the result that the rough treatment of the trees soon brings an end to their existence. Some of the Indian tribes, however, have enforced their claims for several years at a time to selected localities, and by especial care have preserved some few groves of large rubber trees. In some of the forests which have been deserted young trees are now growing rapidly, and it is thought that these might profitably be converted into groves or orchards and permanently cared for.

Division five, along the eastern coast on the Caribbean Sea, includes about 200 square miles of rubber-producing areas alongside the creeks and rivers. The population is composed largely of Indians and negroes, many of whom are rubber-

collectors and familiar with the recesses in the forests, where once large groves of trees existed, and where now many small trees for planting may be found. They are familiar also with the modes of tapping the trees, gathering the milk and coagulating it by crude processes which will be the basis or principles to be improved and used hereafter, when intelligent interested persons plant and care for large groves of these trees.

The characteristics of localities in Nicaragua where the better species of rubber trees grow most rapidly and vigorously, are: (1) An alluvio-sandy soil, having a large percentage of decomposing vegetable matter, well drained to a depth of three to six feet; (2) a temperature never below 68° F. and usually above 80° F.; (3) well shaded by forests of large trees. These conditions are unsuited for a few good species mentioned in Division three as indigenous in poor, sandy soil of comparatively high altitude.

The class and genera of some of the most desirable species of the India-rubber trees found are:

Euphorbiaceae: Spp. similar to *Siphonia* (*Hevea*), *Manihot* *Euphorbia*, etc.

Moraceae: *Artocarpus* tribe; spp. similar to *Castilloa*, *Artocarpus*, etc. *Moreas* tribe; spp. similar to *Ficus*.

Apocynaceae: Varieties of *Hancornia*, *Colophora*, *Urcolea*, etc. *Sapoteaceae*: Palo de Vacu (Cow Tree), the *Masaranduba* of Brazil.

Another extensive report from Nicaragua is contributed by William Newell, Consul at Managua. India-rubber is produced in this district in steadily decreasing quantities, owing to the wasteful habits of the natives, and it is believed that soon almost no rubber will be exported. Mr. Newell inclines to the belief that the rubber exported is from the *Siphonia elastica*.

In South America principal interest attaches of course to the rubber forests of the Amazon valley, which form the subject of voluminous reports by Consul Kerbey, at Pará. "Figuratively the gold grows on the trees in the Amazon valley," he says; "all that seems to be necessary is to hire the friendly natives to enter the jungles, tap the trees with a hatchet as a wand, and the liquid gold runs into his coffers. There are no dry holes in Amazonian valleys. The rubber tree is in sight everywhere; literally the woods are full of them." Consul Kerbey places the *Siphonia elastica*, which grows on the lower Amazon spontaneously, as first among the rubber trees of the world. Singularly he fails to mention any other species.* In the great rush for becoming suddenly rich lies the danger to the rubber tree. The foreign operators are killing the Brazilian geese that lay the golden eggs. Disinterested parties assert that in the lower Amazon field very many rubber forests, once thought inexhaustible, are already wholly abandoned. No legal precautions have yet been taken by the Government for the preservation of the trees, though it seems now to be the purpose of the Congress to discuss this question.

The territory from which Pará rubber is gathered is about as extensive as all of the United States lying east of the Rocky Mountains. Some of the Pará rubber has to be carried as far to reach Pará as it must travel from that port to reach New York. The tide-washed lowlands of the delta of the Amazon and the annual flood plains of the Upper Amazon and its tributaries are the places where it is found almost exclusively. The Consular district of Pará embraces four Brazilian States, three of which, Pará, Amazonas and Goyaz, lie within the Amazon Valley, while the fourth, Maranhão, belongs almost entirely to

the Atlantic coast, and has a different soil and climate. Maranhão produces but little rubber, and that of inferior quality, according to the merchants of Pará. Goyaz so far has exported little rubber on account of the lack of transportation facilities. The freight by canoes to Pará would cost more than the market value of the rubber at that port. What is shipped goes to Bahia or Rio de Janeiro.

A small proportion of the rubber shipped from Pará comes from Bolivia and Peru, but the great bulk of the crop comes from the States of Pará and Amazonas. During the four months from July 1 to October 31, 1890, of the 5332 tons of rubber which reached Pará from all parts of the Amazon Valley, 1 per cent. came from Bolivia, 5½ per cent. from Peru, 44 per cent. from the State of Pará, and 49½ per cent. from the State of Amazonas.

Consul Burke, at Bahia, in Brazil, reports that rubber is yielded by the *Hancornia speciosa*. The tree is commonly known as the "mangabeira," and belongs to the family of *Apocynaceae*. The tree is of medium size, with drooping branches and small oblong leaves, beautifully and finely veined and rounded at the apex, all of a rich, deep, glossy green. The tree yields a fruit about the size of a large plum, which is much appreciated by the natives, both for eating and for the beverage made from it. This tree is found on loose, sandy soil, unfitted usually for agricultural products.

The *Castilloa elastica* abounds on the Magdalena River in Colombia, which is more than 800 miles long, and has a valley varying in width from twenty to sixty miles. The rubber trees abound on either side and for 1000 feet up the sides of the mountains, and grow also in abundance along the other rivers in Colombia. There are two varieties as indicated by the quality of the product. The rubber produced near the coast, especially on the San Jorge River, is dark, while that produced in the interior is yellowish, and considered superior in the markets. A similar statement is made in regard to the trees which grow naturally over the whole Isthmus of Panama. They grow in the forests as high as forty feet, reach a diameter of three feet, and are capable of yielding from 25 to 100 pounds of rubber per year.

No fear is felt in Colombia of the extinction of the rubber tree. The Government, however, has taken the precaution of prohibiting the further cutting down of trees. In Panama, however, the rubber-gatherers each year have to penetrate further and further into the dense forests to find the "caucho" tree, and the industry becomes yearly less profitable. No government in the world, Consul Thomas Adamson remarks, could reasonably be expected to make its authority felt in the protection of trees in such dense forests as those of the Darien.

The Peruvian rubber or "caucho" forests are fast disappearing and the nearest are now far away. The practice of cutting down trees has been followed until few are to be found except at a great distance up the Ucayali and Javary rivers. The species of rubber trees in Peru are not named except that one, is called in the aboriginal language "santonga" and another "zarenga." Consul Michael Girard, at Frontera, does not feel that there is any fear of failure or early decrease of the natural supply of rubber in his district.

Rubber trees abound in the mountain districts of Ecuador, but the species is not named.

In the Argentine Republic—in the forests of the Gran Chaco in the northern part—and also in the Republic of Paraguay there is a tree whose name in the Guarani language is "mangáicé," which yields an excellent quality of India-rubber though the industry has as yet been little developed.

Caoutchouc is obtained in India from at least six genera of

*The Consuls do not undertake to treat authoritatively or exhaustively of the nomenclature of rubber-yielding species, their inquiries being directed for the most part to economic questions. Persons interested in greater detail on this subject will find a treatise of value by Mr. Courtenay DeKalb on "The Rubber Plants and Rubber-Yielding Area of Tropical America" in THE INDIA RUBBER WORLD of October 15 and November 15, 1890.—EDITOR.

plants belonging to three widely different natural orders: *Landolphia* and *Willoughbeia* to *Apocynaceæ*; *Castilloa* and *Ficus*, to *Urticaceæ*; and *Hevea* and *Manihot* to *Euphorbiaceæ*. There is a great variety of rubber-yielding plants, indigenous to India, says Consul-General Samuel Merrill, of Calcutta, and time and money have been spent in experimenting with worthless milky shrubs and climbers. Little rubber, he says, is derived from southern India, and that principally from neglected vines. The rubber of Indian commerce is procured from the northern country and almost exclusively from the *Ficus elastica*, which is found in the damp forests at the base of the Sikkim Himalaya, in Assam, Chittagong, and Burmah, and probably in the unexplored regions to the east. It requires an exceedingly damp atmosphere. The seed germinating often on the summit of a lofty tree, sends down its far-reaching roots and from the top of these grow horizontal branches and a dark green dome of leafy boughs. In time, the fostering stem having been overshadowed and destroyed, a hundred pillar-like trunks hold possession. Here, too, rubber is gathered in the most destructive manner, and Mr. Merrill says that nothing is more interesting than to observe the untiring efforts of the British Government for the conservation of the forests. In the single province of Bengal 11,468 square miles are under the control of officers of the Forest Department. One district in Assam, eighty by thirty miles in extent, is said to contain 43,000 rubber trees, many of them over 100 feet high. Some of the jungle people mix with the produce of the *Ficus elastica*, rubbers derived from two large creepers, the *Chonemorpha macrophylla* and *Rhyncodia wallichii*. Major J. A. Betts is quoted as stating that while an officer in the Chinese army he explored the large islands of Formosa and Hainan and found the forests filled with untouched *Ficus elastica*.

India-rubber is produced to a small extent in the Straits Settlements, particularly in North Borneo (British). Caoutchouc

does not appear to have been known as a product of Asia until 1798, when a plant afterwards named *Urceola elastica* was discovered to yield it by J. Howison, a surgeon of Penang. Since then several other plants have been found to yield rubber, namely, the *Willoughbeia burridgei* and *Leuconotis engenifolius*.

In Dutch East India a limited number of India-rubber trees are found in Java, and a larger number in Sumatra. The rubber from the latter is sold at Padang, Singapore and Batavia. There are some trees in Siam, and the country has been searched in the hope of finding them in sufficiently large numbers to justify a trade in crude rubber, but all such attempts have failed.

The Vice-Consul at St. Paul de Loando, in Africa, Mr. Edward Bannister, reports that India-rubber trees and vines grow in immense numbers in that province, say from 12° south to 5° north latitude. He has not learned the botanical names except that a Portuguese authority designates two species as *Hevea caout-cheuc* and *Jatropha elastica*. The French in the colony of Gaboon were pioneers in the exportation of crude rubber, which began some twenty years ago and has increased steadily. A new source of rubber supply was discovered some three years ago in the district of Bihee. This is a tuber something like a large potato in appearance, from which it is claimed that a good quality is produced. It is to the discovery of this new supply that Benguela owes the recent enormous increase in its export trade. The gathering of rubber is in the hands of savages, and there is a feeling that the supply of rubber must sooner or later receive a serious check.

Rubber is yielded by trees in Zanzibar, where the extinction of the trees is also threatened.

The few trees and plants that produce caoutchouc in New South Wales are of little commercial value. There are several native fig trees, notably the *Ficus rubiginosa* and the *Ficus macrophycea*, but the percentage of yield is very slight.

THE CULTIVATION OF RUBBER TREES.

THE question of cultivating the India-rubber tree in Mexico has been agitated considerably by private parties, as well as by the federal authorities of the Republic. The supply of rubber in the accessible regions is diminishing steadily while the demand for it increases. Practical experiments in the cultivation of these trees, according to the officials of the Bureau of Agriculture, have demonstrated beyond doubt that this industry can be established with profit. Three young trees transplanted from a forest to a cultivated field in Escomusco are now said to be seven feet in diameter, and have yielded rubber for more than thirty-five years, the present product averaging more than fifty pounds of gum per year. A so-called conservative estimate of the cost and profit of rubber-tree culture has been made upon a basis of 10,000 trees, planted about twenty-three feet apart, as follows:

Cost of 160 acres of land, 40 cents per acre.....	\$ 64
Clearing and breaking the ground, at \$4.50 per acre.....	720
Planting the trees, at \$2.25 per acre.....	360
Cultivating the soil five times in six years, at \$3.50 per acre...	1750
Total.....	\$2894

In the sixth year it is estimated that these trees should yield six pounds of milk each, or 60,000 pounds altogether, in which the maximum of water contained would be 56 per cent., so that the rubber obtained would be:

26,400 pounds, at 30 cents per pound.....	\$7920
Labor for collection and evaporation, at 3 cents per pound. \$ 792	
Total expense up to date, six years after purchase.....	1894 3686
Leaving a net profit at the end of the sixth year of.....	\$4234

The profit of the seventh year would be at least \$7920, less \$792, or \$7128. In regard to profits of this industry in general, it is to be taken into consideration that as the trees grow larger there would be an increase in yield, without a corresponding increase of expense, so that profits may reasonably be expected to increase year after year. It is stated that the culture of these trees in Mexico can be combined profitably with the raising of cotton.

Near San Benito is a rubber plantation of twenty-five acres, the trees being now about five years old, looking well, and giving promise of becoming very profitable to the owner. The native tree is hardy and quick-growing, but does not reach a size large enough to be tapped for ten or twelve years. In Tuxpan some experiments in rubber culture have been made, showing that the rubber tree will flourish under cultivation, but nobody has seemed to possess enough patience to care for the trees until the productive period begins.

In Costa Rica the Government is making earnest efforts to repair the damages done to the rubber forests by careless gatherers, by inflicting penalties for the further destruction of trees and granting rewards to those who cultivate them. There are some small plantations in this State, but they are too young to have produced any results of value.

The Government of Guatemala is attempting to encourage the planting of rubber trees. Hitherto most people have been discouraged from planting them owing to the length of time needed for the production of gum, but there are now several

thousand trees under cultivation whose owners expect within a few years to reap a fortune from them.

Several unsuccessful attempts have been made in Nicaragua to cultivate rubber trees, and from them has resulted the current opinion, even among the more intelligent people, that cultivation decreases the extent both of exudation and of caoutchouc. Mr. J. Crawfords, however, traces these failures to the fact that no proper regard was had to locality, temperature, soil, or atmospheric conditions selected for the indigenous plants that were transplanted to uncongenial localities. In many cases sufficient provision was not made for shading the young rubber trees; hence the growth of the latter was retarded and only a small amount of emulsion yielded. Nearly all the lands suited to rubber cultivation are national lands, which can be bought at about 60 cents per acre. Probably the Government may make concessions of land or exemption from military duty of laborers to persons coming well recommended and able to convince the Government that they have necessary capital and the intention to make thorough experiments. Some of the work required is the cutting down and burning of the undergrowth in forest localities, or planting rapid-growing shade trees where shade is needed, and then setting out plants or cuttings from the forest or a nursery. Some of the plants which may be grown as inter-row products in rubber plantations are rice, bananas, plantains, sisal and vanilla beans. Mr. Crawfords is convinced that intelligent attention and care will improve the quality and increase the quantity produced by the different species of rubber trees in Nicaragua.

One attempt at rubber cultivation is reported from Ecuador. In 1884 Mr. Morla, a wealthy gentleman of Guayaquil, planted 20,000 trees, but inasmuch as they are not to be tapped until reaching the age of ten years, the result of the experiment cannot be yet known. About 320 trees to the acre were planted, and it is expected that at maturity the yield will be about three pounds per tree.

Consul Newell, writing from Managua, is also convinced of the practicability of rubber-tree culture in Nicaragua. The principal experiments he has observed were where rubber trees were planted for "coffee-nurses," or to afford shade for young coffee trees, no special regard being had in any case to the development of the rubber industry. On one plantation there are 9000 such trees of the *Castilloa elastica* variety, which have never been tapped, although they would yield from thirty-five to fifty pounds of rubber biennially. The Government has offered a premium of 10 cents for each rubber tree planted under certain conditions, as to distance between the trees.

Consul Nickeus, at Barranquilla, Colombia, is informed that on the San Jorge and Sinu rivers rubber trees are cultivated to some extent. He has seen trees grown from the seed and cultivated for two or three years, which are now eighteen inches in diameter. While the tree is susceptible of culture, he sees no reason for cultivation when there are millions of acres of rubber forests. In regard to rubber plantations on the river Sinu, Consul C. I. Croft, at Carthagena, reports that several contain from 10,000 to 20,000 trees each, and that the owners are highly pleased, although the trees are not yet large enough to yield rubber. Mr. Croft himself has grown from the seeds vigorous healthy plants two feet high in two months, and he has seen a plantation raised from the seed in which the trees measured a foot in diameter and over twenty feet in height. He has been told that a tree ten years old will yield twenty pounds of rubber a year, without retarding its growth.

A few thousand dollars have been invested by the Panama Plantation Co. at Colon in clearing the undergrowth from the forest, and planting 20,000 young rubber trees now two years

old, and it will cost probably \$2000 per year to keep down the undergrowth for six or seven years, when it is hoped that the trees can be tapped. The president of the company is D. G. Mott, and the secretary and treasurer O. B. Shaffer, both from the United States. It was only after the destruction of rubber forests had told upon the market that the subject of cultivating trees attracted attention. So far the company feel much encouraged. Not more than 5 per cent. of the trees were lost in transplanting, the balance taking good root and shooting up very rapidly. This seems to be about the only instance in which American capital has been invested in rubber-gathering or rubber-cultivation on an important scale in any part of the world.

Consul W. E. Sims at Colon says that the highest estimate there for the cost of clearing and planting an acre of rubber trees is about \$40; add annual cost of keeping down the undergrowth, \$15 per year for six years, and the total outlay will be \$130 per acre in seven years. After this time it is estimated that an annual yield of \$1875 per acre can be had, of which only \$375 will be needed for cost of gathering and shipping, leaving a yearly profit of \$1500 on an investment of \$130. Land can be had for the surveying fees, which are not more than 25 cents per acre.

Some attempts at rubber cultivation have been reported from Peru, notably one by Mr. Antonino Buhres, of San Juan Bautista, and another by Mr. Louis Martin, of Montecristo.

The late Consul to Pará, Mr. Joseph O. Kerbey, devoted considerable attention to the subject of the experimental planting of rubber trees, the result of his inquiries being embodied in the series of reports under consideration. Mr. Kerbey took sufficient interest in this subject to study the similarity between portions of the Amazon Valley and the Everglades of Florida with respect to the conditions of moisture, heat and soil. He reports sending rubber nuts and plants for experimenting to a practical farmer of long experience having a plantation near Orlando, Fla., who it is hoped may be able to give the matter some attention.

There is no question whatever as to either the practicability or the immense lucrativeness of rubber growing in the Amazon Valley, says Mr. Kerbey. It is solely a question of "time." The only, but the eternal, objection raised is that the rubber tree does not produce sufficient milk to justify the attention required until many years of growth have elapsed. The Brazilian people are slow to act and the prevailing sentiment seems to be to "let well enough alone."

The seeds of the *Siphonia elastica* are abundant and easily obtained. These are somewhat smaller than horse-chestnuts, which they resemble in shape, and grow three in a capsule, which burst with a sound resembling a fire-cracker, throwing the nuts to some distance. In one day a man could gather enough of them to plant a quarter-section of land. They germinate easily and grow rapidly. They need plenty of moisture and heat, but not too much direct sunlight while young.

The young rubber trees can be found in the forest and transplanted with facility, being careful not to plant them too deep, spreading out the roots horizontally, and shading them until they have reached a certain height. But it is much less labor to plant the nuts in a garden bed, taking care to protect them from the sauba ants and the sun's rays until they are ready to transplant. When six or eight inches high, they should be removed to small half-bushel baskets of earth, in which they may grow until they two or three feet in height. They are then ready to be planted where they are intended to remain. The basket, which costs but a few cents, is set into the ground with the plant just as it is, and the work is done.

The trees will never crowd each other if planted twelve feet

apart. That will give 538 trees to an acre of ground. The land needs no preparation. The young trees will do well if planted in the original forest, but it would be still better to plant them among "second growth" of a last year's clearing. The second growth would give the necessary shade to the young rubber trees, and these would soon shoot above it. At the end of the first year the young trees will be from eight to ten feet in height, and from twelve to fifteen at the end of the second year. No cultivation or care is necessary.

The rubber tree thrives well both on low and high land; but in order to yield plenty of milk it must have plenty of moisture in the soil part of the year at least. For example, on the river Purus, where the flood plains are covered with water from one to three or four months in the year, the trees on these levels yield milk in abundance, while thrifty trees of the same sort, not reached by the floods, do not pay for the trouble of tapping them. On the Lower Amazon not only the trees on the tide flats and annual flood plains yield milk in paying quantities, but also those on the high land, because the abundant rains of six months or more in the year supply abundance of water to the soil. The extent of territory in the Amazon Valley that might profitably be planted in rubber trees would yield not only rubber enough to supply this world, but might safely take the contract for the whole solar system.

The great advantage of a compactly-planted rubber forest or grove would be the saving of labor in the traveling through the swamp. The rest of the labor is light and quickly done, except, perhaps, the coagulation of the milk.

Taking the most unfavorable figures of the rubber swamp and applying them to the rubber grove, it may be calculated that the man who cares for 150 trees in the swamp could care for an acre with its 538 trees. As four kilos is an average yield from the 150 trees, his 538 would yield him fifteen kilos of rubber per day. One dollar per kilo is an average price here. Thus the laborer gets \$15 per day, with no expense but his ordinary living expenses, during four or five months in the year.

Then why don't they plant rubber trees?

That is the same question that Brazilians are now beginning to ask each other. The only difficulty in the way, as previously stated, is that it takes from twenty to twenty-five years for a grove to come to yielding profitably. It is a long time to wait. But every one confesses that it would be a magnificent investment of capital. The few experiments that have been tried prove that they are right.

In 1865 Sr. Joaquim Antonio de Silva, now deceased, but then living on the river Guama, twelve miles above the city of Pará, had 20,000 young rubber trees planted on the low alluvial island in the river, called Bom Intento, which formed part of his estate. He paid to Francisco Bahia, the man who did the work, the sum of sixteen cents apiece for the young trees when planted. The 20,000 young trees thus cost him a total outlay of \$3200.

Unfortunately the trees were all planted near the margin of the island on its whole circumference, as only a small part of the island was to be planted, and it was less trouble to plant near shore than to work his way through the jungle farther inland. The tide ebbs and flows with tremendous power, and tears away and builds up the island at one or the other end, alternating by periods of ten years. Consequently the upper and lower ends of the island have both been torn away and built up again since the trees were planted twenty-five years ago. The sides of the island have also suffered some, so that now only about 1000 of the original 20,000 rubber trees are remaining.

But they are fine trees from thirty to forty feet in height and nine or ten inches in diameter. The present owner of the island

is Sr. Joaquim Nunes da Silva Matta, a well-to-do merchant of Pará, who inherited the island from its former owner. The trees yield abundantly, although they are being tapped contrary to the orders of the owner, who would like to have them lie idle a little longer.

Though the ground covered by the trees would probably not exceed two acres in extent, the owner considers them a very valuable piece of property. The trees have never cost a cent for care or cultivation since they were planted, and if they had been planted a little farther inland, a few rods only, nearly the whole 20,000 trees would now be standing like those which remain.

Some of the American colonists at Santarem have planted some rubber trees, both on high and low land, though not in large numbers. The trees are as yet only a few years old, but they are growing finely and require no care.

The most important steps in the cultivation of rubber to-day are being taken under the auspices of the British Government in its possessions in India. The British Government has come with the purpose of staying and it can afford to wait long for the large returns which are certain to be derived from its investments in plantations and forest reservations. In this respect it undoubtedly will repeat the experience of its agents in the cultivation of the barks yielding quinine, which were formerly found only in Peru and have now been domesticated in the British possessions in the East with the result of cheapening the price of this drug throughout the world. This experiment required, however, twenty years for the first profitable result. Consul-General Merrill, writing from Calcutta, quotes Dr. George King, superintendent of the Royal Botanical Gardens, as expecting a decided increase within a reasonable period, as the effect of the protection of rubber trees within British territory. At the same time, however, Mr. Gustav Mann, the Conservator of Forests, is equally convinced "that there is sure to be a decrease of the natural supply from this country." No practical scientists, it is added, stand higher than these two gentlemen. Be the results of forest protection and forest destruction what they may, the Government is using great precautions against the absolute ruin of the rubber industry in India by starting *Ficus elastica* plantations in different parts of the country.

The only successful rubber plantation of any size in India, so far, is in the Durrany district of the province of Assam. Its area is now 1538 acres and the trees are growing luxuriantly. Since it is not thought to be wise to tap the trees before they are twenty-five years old, no estimate can as yet be made as to what the product will be. As it is said that an amount varying from forty to eighty pounds of rubber has been taken from a forest tree yearly without injury, there is an opportunity for every one to make his own calculation as to the outcome of the governmental experiments.

Major C. T. Bingham, Conservator of Forests in the Tenasserim Circle, Moulemein, has made a report to Consul-General Merrill in regard to experiments made near Mergui in Burmah, in introducing the *Hevea Braziliensis*, beginning in 1879. Out of a large number planted only fifty survived the attacks of white ants and other enemies. The ten largest of these, two feet from the ground, measured in girth from two to four feet. The older trees having begun to bear seed, some experiments were made, resulting so successfully that in 1887 there were on hand, small and large, 14,841 plants. The fifty older trees now appear to be in such perfect health as to leave no doubt that they are fully established and that the propagation and acclimatization of the *Braziliensis* has been successfully demonstrated. Samples of the *Hevea* rubber taken from forty-two trees were sent to the Royal Gardens, Kew, and subsequently submitted for valuation and report to the India-Rubber, Gutta-

Percha and Telegraph Works Co. (Limited), at Silvertown, the experts of which have made favorable reports as to the quality of the rubber.

Consul W. Morey, writing from Colombo, Ceylon, states that the rubber tree is grown there experimentally, but that no appreciable quantity of the product has yet been obtained.

Experiments in the cultivation of the rubber tree are now being made in Java by the Netherlands India Government and also on a small scale by some private landowners. The result is not fully known yet, because it is expected to take about fifteen years to prepare the trees for tapping. It is believed, however, that the trees are susceptible of profitable cultivation. The Consuls from the various ports in Africa state that no experiments in the cultivation of rubber trees have been made to their knowledge.

An exhaustive report is made by Gilderoy W. Griffin, the Consul at Sidney, New South Wales, whose recent death has caused a great loss to the Consular service of the United States. He states that experiments have been made on both exotic and indigenous trees, some of which have been cultivated long enough to yield specimens of caoutchouc. Mr. F. Turner, F. R. G. S., the Government Botanist of New South Wales, is quoted as saying that "there is a great future for the India-rubber trees in northern Australia." Mr. W. Hill, late Colonial Botanist for Queensland, in giving evidence before a legislative committee on forest conservancy, when asked as to the probability of a good rubber tree being discovered on the northern coasts, said: "I have not the least doubt that some of the fig trees on the Daintree and Johnston rivers will produce a good deal of India-rubber." Again he says: "The fig-tree reserves in the north would make excellent places for the acclimatization of such trees as the bottle India-rubber tree (*Siphonia elastica*) and the Gutta-percha plant (*Isomandra gutta*) as I am convinced that they would flourish admirably there."

A Ceará rubber tree (*Manihot glazioni*) was introduced and produced flowers in the Botanic Gardens at Brisbane as long ago as 1867. It is now more than twenty-five feet high and has

yielded samples of good rubber which have been shown at the intercolonial exhibitions. As it will thrive on very poor, dry soils, it is expected that this tree will prove a valuable acquisition in Australia. Other rubber plants which are now growing in Australia, but which have not been introduced long enough to permit the making of tests of value, are the West India rubber plant (*Castilloa elastica*); the India rubber vine (*Cryptostecia grandiflora*); the Pará rubber tree (*Hevea Brasiliensis*) and the African rubber vine (*Landolphia florida*). Mr. Turner, the Government Botanist, recommends rubber culture as a paying undertaking, especially if other crops of commercial value should be grown in connection with the rubber plantations.

A specimen of caoutchouc produced from the *Landolphia florida* in Egypt accompanied the report of Consul-General Grant of Cairo. The authorities of the botanical gardens there state that the cultivation of the rubber tree would be impossible under the climate of Egypt, but that it would grow luxuriantly in the Soudan, beyond Khartoum. It would not be necessary there to introduce new plants, but only to develop and regulate the cultivation of the *Landolphia*, which grows there spontaneously.

A leading New York nursery firm extensively engaged in the culture of tropical plants on the island of Trinidad have found that the *Ficus elastica* can be grown there in open districts, but that the rate of growth is very small. They have experimented also with the *Castilloa elastica*, which they feel would prove profitable after five years. It grows freely and to a good size, and nearly one-third of the island is suited to its growth. It would also do well in Tobago. The Royal Botanical Gardens of the colony of Trinidad report that their trees of the latter species are thriving, and producing seed in large quantities. Many plants have been raised for which there has been a constant demand. This tree, however, will thrive only under shade. Those exposed to the sun are in the dry season stunted and dwarfed. At the gardens the *Ficus elastica* is regarded as very hardy, growing to a large size in the open.

RUBBER-GATHERING IN THE AMAZON VALLEY.

By Joseph O. Kerbey, Late United States Consul at Pard.

TO get a correct idea of the *modus operandi* of gathering and preparing the rubber, it is necessary to have some notion of the circumstances and surroundings, which also include the business customs and ways of the city and forest people. The traders (*negociantes*) in the rubber country are generally rough-and-ready Portuguese or Brazilians, the larger part of them with little or no capital of their own when accounts are all balanced.

Very many of the rubber-swamp claims "belong," off and on, to business houses in Pará and Manáos. These they are ready to sell or rent. They, as a rule, prefer the former, as they often get the swamp claim back again, through the failure or death of the purchaser, in a few years, and for, perhaps, a fifth part of the price they sold it to him for. The unfortunate widow and orphans, when there are any, are shoved out into the forest penniless. It is said that on the upper river, the widow, if young and attractive, is often bargained off to another trader, and the choice given her to become his mistress or die in the forest, or worse.

The margins of the larger navigable rivers have been generally "prospected," and the most valuable rubber forests are now "owned" by some one, although there are immense tracts

of unexplored territory on innumerable small tributaries, to be reached by canoes or small steam launches. The first title of a rubber swamp is generally determined by discovery and first possession. Frequently this remains the only title for years, and on the upper tributaries especially this is the case, the legal survey and purchase of the land from the Government being effected only when the land passes into the hands of the capitalists who receive it in payment of debt.

Meanwhile, the owner who pre-empted it must prove his right to it by constant rifle vigilance. No one leaves his hut without his sixteen-charge repeating rifle. There exists a class of desperadoes or "border ruffians," called in the frontier language "capangas." Many of the traders, both owners and renters of rubber swamps, have their gangs of "capangas" who are hired expressly for the purpose of maintaining the forest claim in question. Feuds often arise which at last end in a massacre and burn-out. Mention is made of a case in which such a massacre was surprised by a steamer suddenly rounding a bend on the river Jurua. Fortunately one woman had been tied to a tree to be kept until after the trading station was fired. She was rescued, and her testimony resulted in the arrest of thirty criminals implicated in the massacre. But generally the

attack is not so daring; the night is chosen for the slaughter, and the criminals are undetected, though not usually unknown. It is a common saying that "he who has rubber will not go to jail."

Sometimes there is more formality even in the attack, and something like the rules of civilized warfare are observed. Capt. Guilherme G. Hoepfner, of the steamer *Eufrosina*, a few years ago, witnessed a formal battle between two gangs of capangas, headed by their employers, who were disputing the right to build a shanty for trading supplies at the confluence of two little rivers. The captain spent nearly the whole night before trying to persuade the stronger party to leave the other in the rightful possession of the point of land he had proper possession of, but to no avail. In the morning more than 2000 shots were exchanged across the little river from the repeating rifles, all of which resulted in one bullet hole through the shirt of the leader of the attacking party. He immediately stuck up a piece of white cloth on a stick from behind his stump, and the firing ceased. A few minutes later he was in his canoe with his capangas and paddling unmolested down the stream in retreat.

Such was the state of things formerly on the Lower Amazon, but law has gradually taken the place of brute force as far as land titles are concerned.

Now, when a man decides to go into business as a trader, having but little capital, as is the case most frequently, he goes to some one of the native business houses which deal directly with the traders and are called "casas aviadoras," or "furnishing-houses." With the firm he makes a bargain to take one of their rubber swamp claims and work it for one or more seasons for a stipulated compensation. He gathers up a number of persons—Indians, negroes, half-breeds, white men—any sort of fellows that he can induce to go with him for the season. He obtains on credit from the firm supplies for his company and goes to the swamp. He probably finds the principal shanty (barracão) still standing from the previous year; but the thatch roof will need some mending or renewing, as also the wattle and daub sides. This will be the trader's headquarters for provisioning his rubber-gatherers. The men will build their huts for their own shelter. These are near the river brink, usually. Poles are driven into the mud and on these a floor of small palm trunks is laid. Taller poles support a palm thatch roof, and the hut is considered finished. If any of them have brought a woman along they may make a room for her convenience by partitioning off part of the floor with palm leaves. In two or three days their homes are finished and they turn their attention to the forest paths, which they must clear out and open to reach the rubber trees; for since the previous season they have been overgrown by the luxurious tropical vegetation.

It is the closing of the rainy season, May or June on the Lower Amazon, when the milk of the rubber tree begins to be fit for gathering.

Each laborer rents from the trader a certain number of paths (estradas), so that he will have one hundred to one hundred and fifty trees to work. The rent he is to pay to the trader is 20 per cent. of the rubber yielded by the paths he takes. It is, further, "swamp law" that the gatherer is to obtain all his supplies from his trader and turn in to him all his rubber. Each gatherer has his own private mark, which he puts on his rubber, and it is shipped to Pará to the furnishing house, where it is weighed and each gatherer is credited with the market value of the rubber on the date of arrival. The trader is obliged by the "custom-made" swamp law to turn in to his furnishing house all the rubber which the gatherer has in like manner been obliged to turn in to him. Peddlers in canoes visit the rubber-gatherers, and by an easy game of hide and seek

smuggle in provisions to the gatherers, and smuggle away rubber, just as steamer captains carry cash to purchase and smuggle away rubber from the traders, thus relieving the terrible monopoly which this credit system has thus rendered lawful. But the relief is small, as the canoe peddlers do not peddle just for the pleasure of peddling.

The provisions which the rubber-gatherer receives consist mostly of salt fish, jerked beef, salt, sugar, coffee, mandioca meal and rum. The rum should have been placed first in the list and repeated with each item, for the average rubber-gatherer never orders salt fish without rum, nor jerked beef, nor salt, nor sugar, nor anything else without heading the list with rum (cachaça). These provisions have paid a profit of from 25 to 50 per cent. or more to the furnishing house. The trader also puts an equal profit for himself on the price for the provisions. The freight is also no light matter; so that the rubber-gatherer has to pay two, three, or four times the Pará price for the plainest necessities of animal life. What the miserably-fed swamp laborer pays for his mandioca meal, salt fish, and rum would give him excellent boarding-house fare in almost any city in the United States.

In addition to what has been said already concerning the exorbitance, justified in part by the great risks, but none the less oppressive upon the poor laborers, the following translation from an article published by the Conselheiro Paes de Andrade in the paper *A Republica*, of Pará, will help one to understand the desperate fight which the poor rubber-gatherer has to make for his existence. The writer is also the author of a valuable series of articles on land property titles in Pará. He says:

"The rubber-gatherer obtains fabulous profits during four months of the year—that is, while he works; but he spends lavishly, without remembering the coming winter.

"From his first year onward the laborer loses his independence and mortgages his future.

"Debt confronts him from the very start, which, instead of being paid off, grows upon him until the laborer is reduced to the necessity of a life of disguised slavery.

"If he dislikes his employer because he maltreats him, he is sold to another employer for one, two, or three contos of reis (\$500 to \$1500).

"These sales are made without cash payments, but the poor laborer is obliged to pay the debt with his labor, and he remains perpetually enslaved, because he continues to follow the same kind of a life without paying up anything.

"The business is bad for all concerned.

"The capitalist, the furnishing merchant, trusts his capital to the venturesome employer of labor, the country trader located in the rubber swamp, of which he is the owner or renter, and he bears the expenditures of the rubber-gatherer, for whom he has paid an enormous debt to his former employer.

"If rubber brings a good price—that is, if the year is good—the employer of the laborers saves himself and the capitalist, but the laborer remains always enslaved; but if the year is financially bad, the capitalist breaks; the tricky trader changes his house, and gets his new furnisher to buy for a third of their value the paper of the unfortunate man who broke, and he goes to pay up all his debt to the liquidators of the broken house, thus profiting by the misfortune of the one who helped him on.

"Meanwhile no discount is made on the debts of the laborers, of whom he then becomes master and possessor, often exercising his lordship even over the poor man's family." * * *

The above quotation reveals but a small part of the crookedness that is practised in the rubber swamps. What the Conselheiro has stated is all "legitimate" business in rubber circles, and censured only by the sufferers and such high-minded men as he. The confessedly fraudulent methods of cheating and robbing, which the perpetrators prefer not to confess, are multitudinous.

The rubber-gatherer rolls out of his hammock as soon as it is light in the morning, takes his gulp of rum and his calabash of

coffee, starts out to visit his rubber trees. He wears a short pair of breeches, and sometimes a shirt. He goes barefoot, for he must wade through the swamp mud and ooze of the tide up to his knees, and often up to his waist in water. He takes a basket full of earthenware gill cups, a hunk of adhesive clay and a little narrow-bladed hatchet.

If he adopts the most approved method of tapping the trees, he reaches as high as he can with his hatchet, making an incision in the bark, but not reaching through to the wood. The milk immediately begins to issue in rapid drops or little streams. With a spat of the adhesive clay he immediately fastens one of his little gill clay cups just below the bleeding gash, and molds the clay so as to make all the rubber milk flow into the cup. Three such gashes, at equal distances around the tree, and at an equal height, is the rule. The next day he will make three more gashes in the same way, just a little below these three, and so continue, until by the end of the season he will have reached the level of the ground. Each of his 100 or 150 trees is treated in the same way, and he returns home after having travelled from three to five miles, barefoot and almost naked, through thorny thicket and malaria-steaming swamp.

When he reaches his hut again he takes another gulp from the demijohn, snatches a breakfast of salt fish and mandioca meal, which are often moldy from the reeking damp of the swamp, and then starts out again with his calabash buckets to gather the milk, which by this time has ceased to flow. His gill cups are full, or nearly so, and when he reaches home he has milk enough to make four kilos of rubber, on an average. The next task is the coagulation of this milk. For this purpose he has a jug-shaped furnace, made of earthenware, called a *boiao*, open at bottom and top, and with a small aperture at the side to admit the air for the combustion. In this piece of furniture he builds a fire, or rather a smudge, with the nuts of the inaja or urucury palm. The dense black smoke which rolls from the open top of the *boiao* is the reagent which coagulates the milk. For this purpose the rubber gatherer has a circular-bladed paddle, like the paddle of a canoe, which he smears over with clay so that the rubber will not adhere to it. This is suspended by means of a cord from the limb of a tree just above the smudge. The milk is poured over the blade of the paddle, which is then turned over and round about in the smoke, and in a few moments the film of rubber is coagulated. The same process is repeated of wetting with milk and smoking the growing lump until it reaches the weight of from five to twenty-five kilos or more. Then it is slipped off from the paddle as a mitten is pulled off from one's hand. This ball is the crude rubber of commerce. If the coagulating has been carefully done it is "fine" rubber; if carelessly done, and the ball on being cut open at the exporting warehouse shows signs of poorly-coagulated milk or slight mixtures of foreign substances, such as mandioca meal, it is classified as "middling fine" (*entrefina*). There is also a coarser grade still, called *sernamby*, the native Indian word for "shells." This grade is composed of the scraps and bits that have dried without coagulation proper, especially the linings that form in the little earthenware cups and in the calabashes and buckets used in handling the milk, as also the drippings that run down the trees from accidental wounds. These are all rolled up together in a mass and would bring as good a price as the middling fine, were it not for the leaves and other rubbish that manage "innocently" to stow themselves away in the lump.

The method of gathering and preparing the caoutchouc of Peru is to fell the tree and cut it up into bits, limbs and all, and let the milk run out from the wood into hollows dug in the ground. It is then coagulated in these pools by mixing it with

ordinary soap. It produces a most vile-smelling compound which sells for about the same price as *Pará sernamby*. Other methods of coagulation have been tried, but none have given such satisfactory results as the laborious method of fumigation. Alum stirred into the milk will coagulate it rapidly and with far less labor, but the rubber thus prepared is of poorer quality.

If but three gashes per year are made in the bark of the rubber tree, and the hatchet in the careless hands of the native does not penetrate or strike the wood, the tree does not appear to suffer from the treatment, except that the trunk grows thick and the scarred surface becomes irregular and bumpy. It will continue, however, in good health and yield milk in abundance for thirty or forty years. If the blow from the hatchet, however, wounds in the slightest degree the wood of the tree it dies. Decay begins at this wound. As the wood is soft, a little weevil called in Brazil "*punilha*" enters the decayed spot, as a worm does the body, and hastens the destruction. The tree may drag out a miserable half-dead existence, but, as they say in Portuguese, it is "*cáncado*." It will be seen how very easily the destruction of even almost "*inexhaustible*" forests may be completed by a mere blow of a hatchet in the hands of a marauding native. Renters of swamps are naturally less careful of the trees than are the owners, who manage their property from a central rubber station.

RUBBER-GATHERING ELSEWHERE.

It would be a repetition of much that has been written by Mr. Kerbey to quote all that has been said in the various reports on the methods of rubber-gathering. Without exception the Consuls state that rubber trees are tapped by natives who have no thought for the future, and who, in order to get as much of the milk as possible at one time, either cut down the trees or strip them entirely of their bark, which kills them in one season, or make such frequent incisions that the trees die within two or three years. There is a difference of opinion as to the length of life of trees yielding rubber, some maintaining that a large tree will yield seventy-five pounds if judiciously tapped once a year, and will if thus treated live for a great while, but others, who seem equally intelligent, put the life of the milk tree at only four or five years. In British India, where the collection of rubber has been brought in some localities under rigid governmental restriction, fresh cuts are made only in February, March and April, after which the trees are allowed to rest for two years before another tapping. The officials of the Forest Department are empowered also to regulate the making of incisions. The cuts permitted begin about four feet from the ground, on the main stem alone, and are not less than two feet apart, and penetrate the bark only.

Respecting the methods of rubber-gatherers in Nicaragua, Mr. J. Crawfords says that generally the large trees two to four feet in diameter are cut down and a V-shaped canal about $2\frac{1}{2}$ inches wide at the top is cut around the trees at intervals of $2\frac{1}{2}$ feet, and the rapidly flowing milk conducted through improvised funnels of leaves or bark into gourds called "*calabastos*," holding about four to six pints each. From these it is conveyed into a hole into the ground excavated, smoothed and compacted for that purpose. Sometimes these holes in the ground are so made that the milk runs directly from a tree into them.

Another method is the making of incisions two or three inches wide with a heavy knife called "*machete*." These incisions commence high up the tree, descending spirally eighteen to twenty-four inches apart to the roots and the milk is collected as described above. This process is similar to but much rougher than that used in the turpentine forests of North Carolina and Georgia. The rubber-gatherers ascend the trees by

attached vines or by an improvised ladder of vines or by a hoop made of a vine and passed loosely around a tree and their body.

Still another method is by cutting holes, entering diagonally upward, in lines around the tree, commencing as high up as the rubber-gatherers can reach. On the completion of each hole a small clay cup is attached to its lowest side and the milk gathered in these cups is emptied into calabases.

The milk thus gathered is placed under cover in a warm place, and in a few days a large part of the caoutchouc globules float to the top and cohere, but in the meantime fermentation has commenced and decomposed some of the globules and possibly prevented the formation of others. In other cases, by slowly heating to about 165° to 175° F., which the natives guess at, for they have no thermometers, and stirring while hot, adding the expressed juice or a decoction of the leaves of the convolvulus, the India-rubber is separated from the remaining parts of the milk.

A third method of preparing the rubber is by heating thin layers of the fresh milk on a wooden paddle, such as they use for their canoes, coated with clay in the dense smoke of slowly burning palm nuts or other oil nuts, or the wood of the liquid-amber. Occasionally alum or other salts are used, but this appears to injure the elastic properties of the rubber.

Trees from one to three and a half feet in diameter should yield annually from two and a half to twenty gallons of emulsion, from each gallon of which about two pounds of India-rubber should be collected, containing 30 to 35 per cent. of caoutchouc, the remainder being a watery liquid, holding malic acid, tartaric acid and nitrogenous compounds. April, May and June are the months during which the vines and trees yield the largest percentage of India-rubber, and are also the season when the trees rally more rapidly from the loss of sap, and when there is least danger from the larvæ of insects.

The description given by Consul Newell, of Managua, of the methods of gathering rubber tallies with that given by Mr. J. Crawfords, except that he mentions that as the number of trees grows less, the means used become different. Instead of making a large hole in the ground, and making one cake of the product of many trees, known as "torta," it is now becoming customary to allow the milk to remain in the channels in the trees from one to two weeks. The rubber thus taken out is known as "borricha," and it is thought to be a superior quality because containing less water.

To make the milk coagulate soon, the rubber-gatherers make a decoction from the vines found on the rubber trees (*Calonyction speciosum*) which being added to the milk in the proportion of one pint to a gallon, coagulates it to rubber, which is made into round flat cakes. Sometimes the fresh milk is mixed with the coagulating decoction, and then heated from 160° to 175° F. in the gourds, with the result apparently of obtaining a more elastic and less gummy rubber than by other processes.

It is mentioned that in Tuxpan, Mexico, the milk drawn from rubber trees is placed in earthenware vessels, and whipped with a weed called "coyuntla" which is an astrigent that causes the milk to curdle, making the crude rubber. There is no mention made of the use of artificial heat in curing rubber in Mexico.

In Colombia the sun's rays are generally depended upon for heat in curing rubber. They cut V-shaped incisions in the trees, and run the sap into troughs of clay, where it soon solidifies, in consequence of the evaporation of the watery portions. The rubber is next suspended in the sun, or exposed to a gentle fire. When the gatherers have collected as much as can be carried on their backs it is taken to Barranquilla, where further moisture is expressed by mechanical means, when the rubber is considered ready for the market. The rubber-hunters here rarely carry with them food or vessels for collecting rubber, depending upon the game and other food which the forests yield.

A European house in British India has adopted the plan of running the rubber milk into wooden bins six feet square, partially filled with water, on which the rubber floats after a time. While the caoutchouc is still a liquid it is removed and boiled over a slow fire in iron pans four by six feet and two feet deep. Two parts of water are added and the whole is stirred constantly. When coagulated the rubber is removed with iron forks, pressed, again boiled and pressed, sun-dried and washed over with lime.

The rubber brought in from the region in India bordering on China is wretched-looking stuff, consisting of chunks resembling dark tufa or balls, 30 per cent. of which is sand, bark and clay. Many of the dirty, stringy globes the natives have to sell remind one of a ball made by a thrifty mother of different sizes of twine, that has been played with in the muddy streets by her scampish sons. These unscrupulous collectors always conceal a lump of mud in the center of the glutinous mass, imagining, since it is sold nominally by weight, that their cheating has not been foreknown and provided for.

THE RUBBER PRODUCTION OF THE WORLD.

AUTHENTIC statistics do not exist by which the rubber production of the world can be measured accurately, there being no government requirements for estimating the exports from many sections where rubber is produced. Such facts bearing upon the statistics of crude rubber industry as are contained in the reports of the Consuls may possess some value, however, even in their incomplete form, as a contribution to a statistical exhibit of the rubber production of the world. Some of the figures at least will prove of interest for comparison in coming years.

MEXICO.

The export of crude rubber according to the statistics published by the Mexican Government for the fiscal year 1887-1888 is as follows:

To—	Value.
United States.....	\$153,004.20

Germany.....	\$12,632.00
Colombia.....	1,757.00
England.....	1,040.00
Spain.....	525.86
France.....	426.00

Total (Mexican currency)..... \$169,385.06

No statement is made of the weight of rubber exported.

The exports from San Benito are steadily decreasing. The exports to the United States were 256 hundredweight in 1887, 116 hundredweight in 1888, and 60 hundredweight in 1889. The shipments to Europe are unimportant. The exports from Tuxpan all go to New York. There are two American houses in Tuxpan that buy rubber. The amount exported during 2½ years ending October, 1890, amounted to 93,181 pounds, valued at \$55,908.

There are no duties on the exportation of crude rubber from Mexico.

CENTRAL AMERICA.

Costa Rica.—The exports in 1889 amounted to \$6317, being but little more than one half the amount exported during the preceding year. There is an export duty of one-third of a cent per kilogram.

Nicaragua.—The amount of crude rubber exported annually from the Consular district of Managua is about 40,000 pounds, all destined for New York. The total export from Nicaragua during 1887, 1888, 1889, and nine months of 1890, aggregated \$137,615.81. There was exported \$12,412.90 less worth of rubber in 1889 than in 1887. The exports for 1890 showed a still greater rate of falling off. These amounts are in American money.

ECUADOR.

The export duty on crude rubber is 2½ cents per pound. The revenue derived in 1889 from this duty was \$13,980.53, in Ecuadorian currency, the dollar there being valued at 85 cents of American money.

BRAZIL.

Very full statements accompany the reports of Consul Joseph O. Kerbey of the rubber movement at Pará. The figures given, however, have appeared already in THE INDIA RUBBER WORLD, and in their place we substitute here the latest statistics obtainable, being the figures received direct from Pará by this journal.

The exports of crude rubber from Pará during the year 1891, with the names of exporters and the destination of the rubber, were as follows, in kilograms:

[1 kilogram = 2.20 pounds.]

EXPORTERS.	Europe.	United States.	Total.	Stock Dec. 31.	Grand Total.
La Roque, Da Costa & Co....	403,670	2,392,718	2,896,388	270,000	3,156,388
Pusinelli, Prüss & Co.....	1,559,464	1,086,163	2,645,627	210,000	2,855,627
Companhia Industrial do Grao-Pará					
Companhia Mercantil do Pará	1,058,816	1,661,960	2,720,806		2,720,806
J. Vianna & Co.....					
Norton & Co.....	257,730	2,209,458	2,467,188	90,000	2,537,188
R. F. Sears & Co.....	59,534	873,066	932,600	4,000	937,200
Singlehurst, Brocklehurst & Co	212,723	421,678	634,401	70,000	704,401
Denis Crouan & Co.....	539,762	10,080	549,842	62,000	611,842
Rud. Zietz.....	235,070	28,347	263,417	88,000	351,417
W. Brambeer & Co.....	797,210	59,973	139,183		139,183
Sundry Small Shippers.....	275,729	292,657	568,386	87,000	655,386
Exported direct from Manaus.	2,206,160	1,794,798	4,000,957	270,000	4,270,957
Stock in Manaus.....					115,000
Stock in first hands.....					181,000
Total.....	6,937,877	10,831,528	17,769,405	1,447,000	19,236,405

The amount of rubber of each of the leading qualities exported was as follows, in kilograms:

QUALITIES.	To Europe.	To United States.
Fine.....	4,001,712	6,145,529
Entrefine.....	654,948	352,335
Sernamby.....	1,289,321	3,017,710
Caucho.....	412,496	715,354
Total.....	6,145,529	10,831,528

A comparison of the exports from Pará by years is presented below, showing a steady increase in extent, the figures referring to kilograms:

YEARS.	Europe.	United States.	Total.	Stock Dec. 31.
In 1891.....	6,937,877	10,831,528	17,769,405	1,447,000
In 1890.....	6,906,008	9,587,703	16,393,821	1,182,000
In 1889.....	6,794,044	9,092,733	15,886,777	1,304,000
In 1888.....	6,125,989	8,885,269	15,011,258	1,175,000
In 1887.....	5,557,913	8,527,982	14,085,775	1,003,000
In 1886.....	5,086,241	7,970,078	13,056,319	1,049,901

The exportation of crude rubber for the year 1889 from Bahia, according to the local Custom-House figures, was as follows:

To—

To—	Pounds.
Germany.....	199,243
United States.....	89,537
England.....	15,782
Portugal.....	475
Total.....	305,037

This rubber is mainly mangabeira, which is produced largely in the states of Minas and Goyaz, whence about half is shipped to Rio Janeiro, and the other half to Bahia. There is an export duty of 14 per cent. in Bahia.

COLOMBIA.

The Custom-House statistics show the amount of exports of crude rubber from Sabanilla, in this Republic, for four years as follows:

	Pounds.	Value.
In 1886.....	209,308	\$42,570
In 1887.....	715,000	41,650
In 1888.....	761,200	87,250
In 1889.....	600,620	68,275

One dollar in United States gold is worth \$2 of Colombian currency. Nearly one-half of the total exports are destined for New York, a smaller amount for London, and the remainder is divided between France, Germany and Spain. The exports of rubber from Carthagena have been shipped principally to New York. They are stated as follows:

	Pounds.	Value.
In 1885.....	153,780	\$50,215.02
In 1886.....	331,640	178,824.56
In 1887.....	297,253	156,760.25
In 1888.....	443,335	206,840.77
In 1889.....	253,970	100,284.50
Total.....	1,479,978	\$692,925.50

There was also shipped to Germany, during the years 1886 to 1889, 46,464 pounds; to France, 43,472 pounds, and to England, 178,728 pounds. This shows a total of 1,748,642 pounds of crude rubber, and the value is approximated at 45 cents per pound at the point of export.

The invoice books of the Consul at Colon show thirty-seven consignments of crude rubber during the year ending October 1, 1890, amounting in value to \$13,634.60, gold, estimated to weigh about 35,000 pounds. This represented the shipments to the United States. The shipments to other countries were very small. Based upon partial reports from other ports in the Colon district, Consul Sims has made an estimate of the total export of about 80,000 pounds, representing a value of about \$30,000. There are no duties on exports from the district.

The exports of crude rubber from the Consular district of Panama to the United States during four fiscal years are as follows:

	Pounds.	Value.
In 1886-87.....	192,261	\$83,748.03
In 1887-88.....	131,533	53,851.03
In 1888-89.....	100,161	39,742.09
In 1889-90.....	195,362	88,029.08

There is no export duty levied on shipments from this isthmus.

PERU.

The exportation of rubber from Peru is largely by way of Pará, and is included in the statistics from that port. The Consuls generally in Peru are unable to report the amount of crude rubber exported. Consular Agent Hoff reports, however, the shipment in a single quarter of rubber worth \$578.62 from Frontera to New York.

DUTCH EAST INDIA.

The crude rubber exported from Padang in 1886 amounted to 631 piculs, in 1887 to 4104 piculs, in 1888 to 1086 piculs, and in 1889 to 455 piculs, the picul amounting to 140 pounds.

BRITISH INDIA.

The exports from Calcutta for fiscal years ending March 31 in each year were as follows:

	Cwts.
In 1886-87.....	7,598
In 1887-88.....	9,228
In 1888-89.....	8,673
In 1889-90.....	9,934
In 1890-91 (nine months).....	6,719

More than half these exports were destined for England, nearly one-fourth to the United States, and a somewhat smaller amount to Egypt. Of the exports for 1889-90, Bengal furnished 4511 hundredweight, and Burmah 5423 hundredweight. There is no export duty in these countries.

AFRICA.

The quantities exported in 1889 from the district of St. Paul de Loando were as follows:

	Kilograms.
From Mossamedes to Portugal.....	563
From Benguela to Portugal.....	1,065,217
From Benguela to other countries.....	44,700
From Novo Redondo to Portugal.....	268
From Loando to Portugal.....	587,608

From Loando to other countries.....	21,551
From Ambriz to Portugal.....	3,709
From Ambriz to other countries.....	4,368

Total..... 1,727,984

The production in this district has increased very largely of late. The exports from the principal ports in 1884 were less than 400,000 kilograms; in 1889, as shown in the foregoing table, the amount was nearly five times as great. The revenue from export duties on rubber shipped from Loando, Benguela and Mossamedes in 1890 amounted to \$35,061.

The best estimates for an average of the total exports from the Zanzibar rubber districts, under ordinary conditions, would be about 700,000 pounds per year, but during the coast wars of 1889 and 1890 the production was reduced to one-third. The most of the rubber district is now under the rule of the German and British East African companies, and it is expected that the rubber industry will become more important. Rubber is consigned principally to London and Hamburg. Exports to the United States direct amounted in 1889 to only 25,900 pounds, valued at \$11,457.88. There is an export duty of 15 per cent. on the market price at Zanzibar.

RECENT DISCOVERIES OF GUTTA-PERCHA.

SOME of the Consuls residing in districts yielding gutta-percha but little or no caoutchouc have confined their inquiries and the resulting reports to the former commodity. In some cases they express the opinion, as does Consul Alexander R. Webb, of Manila, that unexplored jungles may contain India-rubber trees, but that they have never been explored by white men capable of recognizing them, while the natives, if they have discovered them, have not learned their value.

The Philippine Archipelago forms a vast country, the greater part of which is almost as completely wild and undeveloped as it was 300 years ago. About two years ago gutta-percha found its way from these dense jungles to Manila, where it promises to take a prominent place among the exports. For several years the natives of Zamboanga, Jolo and other southern islands had been sending crude gutta-percha, under the name of "goma," to Singapore, whence it was shipped to England. Apparently it never occurred to them that a market might be found for it in Manila until some enterprising Chinamen sent a consignment there, which promptly brought \$12 per picul of 140 pounds. Since then the price has steadily advanced until gutta-percha is now sold at \$34 per picul. During 1890 about 140,000 pounds were received, all of which was sent to England, and two English houses at Manila sent agents to Zamboanga and the Sooloo islands to endeavor to secure larger quantities. By the end of that year the receipts reached 1400 pounds per month, and four houses were handling gutta-percha.

The method of preparation for the market is doubtless that of the natives of Borneo, who foolishly cut down the tree in order to get as much sap as possible at one time, and thus steadily diminish the sources of supply. All the gutta-percha that now comes to Manila is sent by Chinamen who procure it by barter from the half-savage Moros of the Philippine islands, who are the only human beings who penetrate the deep jungles, and who are not disposed to impart even to the Chinese buyers the location of the tree or the process of the preparation of the "goma." The gutta-percha comes to Manila in ten-pound rolls, a cork-like, light brown, odorless mass, streaked with white, which crumbles readily after the outside

layer is broken. Dirt, leaves and bits of bark are mixed with it, suggesting that the process of preparation is very primitive. The Moros are not an industrious or provident class, and they are disposed to procure only sufficient gutta-percha to supply pressing temporary needs. Now that attention has been attracted to it as a profitable article for export it is probable that an effort will be made to reach the sources of supply, or induce the natives to bring in greater quantities. None has yet been sent to the United States. The export duty is \$1 per ton, and 1 per cent. *ad valorem*, gross.

The gutta-percha here described is supposed to be taken from the same tree (*Isonandra gutta*) from which it is obtained in Borneo. Its existence in the Philippine Archipelago seems, however, never to have been suspected until within the past few years.

The amount of gutta-percha exported from Singapore in the Straits Settlements in 1888 was 23,717 piculs, valued at \$1,112,478. The export of gutta-percha, like the export of almost every article of commerce from the Straits Settlements to the United States, has been on a rapid increase. In 1880 it amounted to \$190, which increased up to 1888 to \$4169. Writing in December, 1890, Consul Rounseville Wildman estimated that the exports to the United States that year would be over \$200,000. These figures refer only to such goods as are invoiced at the American Consulate. It should be remembered, however, that a considerable percentage of the gutta-percha exported to London finds its way in the end to the United States.

It is stated by the Director of the Botanical Gardens at Singapore that there are over ninety-two species of the gutta tree on the peninsula. The gutta-percha exported is produced chiefly by *Dichopsis gutta*, called by the natives "gettah taban merah." The tree is of large size, from four to five feet in diameter, and from 100 to 200 feet in height. It has a clean, straight stem, and may be distinguished generally by the rich brown color of the surface of the leaves. The flowers are small, white and divided into six petals and six sepals. The seeds, generally two in each fruit, are oily and are eaten by birds and monkeys. It flowers in March and the fruit ripens in June. Some of the other

species of the gutta tree in the Settlements are: (1) Geteh toban putch, *Dichopsis polyantha*; (2) geteh toban sutra (silk), *Dichopsis* sp.; (3) geteh toban chayas (liquid), *Dichopsis* sp.; (4) geteh toban simpur, *Dichopsis maingayi*.

The method of collecting the gutta is as follows: A tree having been selected is felled, and as it lies on the ground V-shaped rings, about one inch broad, are cut in the bark at intervals all along the whole length of the trunk and of the branches with a parang (Malay knife). These cuts soon become filled with the white cream-like sap, and in about half an hour the gutta will have separated from the watery portion of the sap and may be removed by rolling a small ball of it round in the cuts, to the edge of which the coagulated gum adheres and forms a disk, varying in size according to the number of scores it is rolled in. These disks are then boiled in water and made into balls and sold by the collectors to the parties who export it to Singapore and Penang. The gutta is at first white, but soon changes to pink, and finally to a brownish red. The amount yielded by a single tree, about 100 feet high, and whose age was estimated to be over a hundred years, was two pounds and five ounces of fairly clean gutta, valued by a Malay dealer at 3s. 3d. per pound. The product of such a tree is thus worth only 7s. 6d., or \$1.80.

Instead of India-rubber, the report from Dutch Guiana made by Acting-Consul William Wyndham of Paramaribo, relates to Balata, the product of the bullet tree, the export of which is attaining considerable importance from that country. The bullet tree (*Mimusops balata*) belongs to the order of *Sapotacea* to which the *Dichopsis gutta* and other gutta-percha trees belong, but appears to yield a superior kind of gutta-percha, the use of which in mixing with India-rubber has been found to be useful. Dr. Hugo Muller, F. R. S., says: "It seems balata is treated by the manufacturers simply as a superior kind of gutta percha, and therefore its name disappears when manufactured. Never-

theless, balata is distinctly different from gutta percha, and this is specially manifested in some of its physical characters; for instance, it is somewhat softer at ordinary temperature and not so rigid in cold. The chemical composition, however, is probably quite identical with that of gutta-percha and caoutchouc."

Without quoting further from Dr. Muller it may be mentioned that the balata he reports is less affected by the action of light and air when exposed than is the case with gutta-percha under similar exposure. Dr. Muller also mentioned that specimens dried by evaporation proved harder than those produced by precipitation in spirits of wine, and the loss in the evaporation in washing and drying was only 25 per cent. as compared to 38 per cent. when precipitated.

The district where the largest number of balata trees are known to exist in the colony is that bordering on the Correntyne River, known as the Nickerie district, which has been given to an English firm to collect balata. The balata industry, though carried on in the colony in a desultory way for a long time, did not until lately assume sufficient importance to lead to any legislation upon it. There are now regulations under which concessions are granted, and quite recently a law has been prepared prohibiting the cutting down of trees, which practice at one time threatened speedily to exterminate the forests. The exports of balata are made to Demerara and no record is kept of their extent.

The balata tree is found in considerable numbers in Trinidad, and some years ago gum produced from it was shipped to England, but the authorities, in order to preserve the forests, prohibited the further tapping of the trees. There is a large number of these trees in Manoa, Venezuela, near the disputed boundary line between Great Britain and Venezuela; also in the State of Maturin in Venezuela. More or less of this balata gum has been shipped to Hamburg by Messrs. F. Ulrich & Son.

SOME INDIA-RUBBER "INFANT INDUSTRIES."

ALL the world is familiar with the importance of the rubber manufactures of Great Britain, France and Germany, which have led so long in so many branches of industry. In the general adoption by the continental countries of Europe of the policy of producing at home as many of the necessities of life as possible, a change is gradually taking place by which the great pre-eminence of the three nations first named is likely to be lost. In this connection, the making of rubber goods has not been overlooked, and nearly every European country is now attempting, with the aid of heavy tariff duties, to foster the home manufacture of rubber. In the succeeding pages is condensed the results of the Consular inquiry made in Russia, Italy and Spain, in which countries general rubber manufacturing is now being attempted, and also in Switzerland, where such manufactures have been attempted only in a single line.

THE RUBBER INDUSTRY IN RUSSIA.

THERE are three large India-rubber factories in Russia, all of which are of recent origin, but which have been managed so successfully that the industry has already become an important one in that country. It appears that great secrecy is observed not alone with regard to the processes employed in these factories, but also as to the character and extent of their output.

The Russian-American India-rubber factory at St. Peters-

burg is declared by some persons to be the largest of its kind in the world. Its directors and shareholders are all German and although it does business under the name of Russian-American, neither of these countries is represented by any capital in the concern. It is not mentioned by Consul-General J. M. Crawford, from whose report these particulars are gleaned, but it is understood in this country that the Russian-American factory has \$1,000,000 of undivided profits, which have been accumulating because of the lack of a satisfactory plan of division.

At Riga is a factory doing business under the name of "Provodnik," the directors of which are Frenchmen. It began work late in the summer of 1889, with a capital of nearly \$500,000. Its output in the first year amounted to about \$500,000 worth of rubber clothing, hose, belting, surgical goods, linoleum, etc. Later it began manufacturing rubber shoes, with the intention of supplying not only the home demand, but also a considerable export trade to Germany and the Scandinavian countries. Formerly the market of Riga was supplied with rubber goods from English and German factories. The "Provodnik" factory was destroyed by fire on November 1, 1890, with the exception of the engines and linoleum building. The work of reconstruction was speedily begun, with a view to introducing the latest improvement in the shape of machinery, processes, and arrangement of buildings possible to be obtained from France.

The third important factory is situated in Moscow. It was founded in 1887, with a capital of \$300,000, and is altogether dependent upon the factory at St. Petersburg. Its directors and capital are German.

Besides these three factories, Mr. Crawford reports five smaller ones in Moscow, which manufacture exclusively shoe-webbing in sufficient quantities to supply the Moscow and the provincial markets.

The imports of rubber manufactures into Russia have fallen off very largely. They amounted in 1883 to 3030 tons, valued at \$1,501,300. In 1888 the imports had declined to \$139,630, and since that year the imports do not seem to have been regarded by the Government as sufficiently important to be separately classified. The value of imports for 1888 is given in detail at follows:

Articles of rubber, with admixture of other material..	\$138,017
Rubber clothing and hose.....	1,513
Rubber shoes.....	100
Total.....	\$139,630

There were exported from Russia in 1888, \$581,200 worth of rubber shoes and \$78,650 worth of other rubber manufactures, making a total of \$659,850. The exports of rubber shoes in 1889 were valued at \$735,558 and other goods valued at \$27,822, making a total of rubber exports for the year of \$763,680. Most of the manufactured goods exported from Russia are sent to Germany, the remainder being shipped to Norway, Sweden and Roumania. Germany in 1889 took 641,124 pounds of Russian rubber shoes. Austria, having a factory of its own, imports very little from Russia.

Mr. Crawford is informed that the native factories in Russia produce a very high order of goods. The ordinary American rubber goods are not considered superior to those of Russian manufacture, and the high import duty renders it extremely difficult for foreign manufacturers to sell their goods in Russia. However, the rubber cloths of foreign make are still imported, as the art of making them has not been learned by the local manufacturers. The duties on imports of crude rubber and manufactures of rubber are given as follows:

	Per 36 pounds.
India-rubber in its crude state.....	\$ 0.20
Goods manufactured of India-rubber, without the admixture of other materials.....	2.25
Same, with admixture of other materials.....	4.07
India-rubber clothing and hose.....	14.93
Rubber boots and shoes, with or without admixture of cloth or leather.....	6.79

The crude rubber imported in 1889, which presumably was wholly for home consumption, amounted to 2,090,626 pounds, valued at \$637,086, of which something more than 1,000,000 pounds was supplied by England and 600,000 pounds by Germany. Nearly the whole amount was received by the Baltic ports.

The Consul at Warsaw reports that goloshes, which are in great use in Poland, and such other rubber goods as are sold in that kingdom, are brought from the factories at St. Petersburg and Riga. The imports of rubber manufactures from other countries consist almost wholly of small fancy articles.

THE RUBBER INDUSTRY IN SPAIN.

THERE are five firms in Barcelona, in the province of Catalonia, known as manufacturers of rubber. They produce, however, only tubing and plain sheets, which they put into the market at prices that practically forbid foreign competition. The machinery employed by these firms is described as being too antiquated to produce any fancy articles that would compare favorably with those of foreign make, hence nearly all the fancy

goods are imported. The list of products of these firms includes valves for machines, patent packing, elastic cord, cloth inlaid with rubber, rubber rings, corks, bed sheetings, tubes, hose and rubber bands. The population of Barcelona is 272,000, and they consume a greater part of the rubber goods, domestic or imported, sold in the province. The other towns in Catalonia, however, and the rural districts are beginning to send in good orders for rubber garments, and it is expected that this trade will become very important. Up to 1888 there had been no importations of rubber goods from the United States, the imports being principally from England, and to some extent from France, Germany and Italy. Mention is made of an invoice of waterproof clothing and rubber boots and shoes sent to Barcelona from Boston, the shoes giving such satisfaction, that during 1890 about \$5000 worth were sold in the province, while the demand for them was steadily increasing. They are described as unrivaled in Spanish markets. The waterproof clothing, however, according to Consul Herbert W. Bowen, proved unsatisfactory as compared with that of English make, and in consequence the demand for it failed.

In addition to the five firms referred to, Charles Macintosh & Co. (Limited) of Manchester, England, are represented in Barcelona, and also in Madrid, Bilbao, Seville, Valladolid, Malaga, Pamplona, Vittoria, Saragossa, Santander, and Oviedo. As a rule the wholesale prices of this house are a little higher than those of the Spanish firms, partly because it delivers goods free of charges, and partly because of the long established reputation of the Macintosh goods. In its retail shop in Barcelona the price-list for boots and shoes, is as follows, the articles mentioned being manufactured in Boston:

	Per Pair.
Ladies' Cape May.....	\$.87
Florence.....	.77
Empress.....	3.47
Women's footholds.....	.65
Men's footholds.....	1.02
Dull friction thigh.....	7.33
Storm King.....	6.47
Pebble short light.....	5.59
Men's plain Oxford.....	1.35
Hub Arctic.....	2.50
Women's light buckle Arctic.....	2.02
Whole vamp foothold.....	.65
Child's Broadway spring heel.....	.53
Boy's plain self-acting.....	.97
Men's dull friction hip.....	6.83
Bright wool hip.....	6.90
Women's croquet.....	.69
Misses' croquet.....	.54
Women's imitation self-acting.....	.85
Women's wool boots.....	2.79
Misses' cotton boots.....	2.17
Child's cotton boots.....	1.83
Misses' Wool boots.....	2.35
Men's dull friction knee.....	5.03

The garments sold in Barcelona by the Macintosh company are made up from cloth imported from their works in Manchester, England. Prices for overcoats for men range from \$5.98 to \$16.21, and for cloaks for women, from \$6.94 to \$15.32. The company make a discount to the trade of 25 per cent. There are no exports of rubber goods from Spain except to her colonies. The domestic manufacture of rubber goods in Spain is encouraged by duties varying from 15 to 96 cents per kilogram, all duties in that country being computed by weight. It is estimated that the duty on an average rubber coat will amount to \$1.15.

In the southern districts of Spain the trade in rubber goods must always be comparatively small because of the climate, which is such as to render rubber garments and shoes almost unnecessary and sometimes insufferable. Even in the north of

Spain the climate is not as favorable to rubber-men as might be desired. Consul R. W. Turner, writing from Cadiz, states that he has never seen a rubber boot or shoe in the province of Andalusia, but the introduction of rubber wraps is well under way there. In a great part of the country, however, a rubber outfit is desirable as a part of one's wardrobe during the rainy season of autumn and winter, and Consul Bowen feels that the importation of goods from the United States could be largely increased if proper efforts are made to cultivate the trade.

A dealer in waterproof wraps in Cadiz, whose customers are both men and women, reports the sale of these articles as increasing. He buys only in Germany and England, of two important commission houses, one in Hamburg and the other in Manchester, which deal in rubber goods "on a grand scale and conditions." He is unacquainted with the American rubber goods, and does not know how they compare with those of other countries. This dealer is D. Viniegra, a leading dry-goods merchant.

The total amount of rubber goods, including a small amount of crude rubber, imported by Spain during the nine months ending October 1, 1890, was 139,130 pounds, valued at \$175,170. The imports for the nine months ending October 1, 1889, amounted to 170,247 pounds, valued at \$209,457. There is no means of knowing what proportion of this amount is of crude material.

The Consular Agent at Huelva states that the imports of rubber manufactures at that port for the year ending July 1, 1890, amounted to 5½ tons, of the value of \$1120, and consisted almost exclusively of sheets and tubing and other forms for machinery and mining. The imports were all from England and declared as of British origin.

It is asserted that orders will not come from Spanish buyers to American rubber manufacturers unsolicited, nor by the use of circulars published in a foreign language. As Consul Bowen says, an exporter to Spain from the United States must necessarily expect sharp competition in all garments and fancy goods. Compared with other foreign exporters he is at a disadvantage in two respects—distance and lack of direct communication with the ports of Spain. But even if he can afford to compete in Spanish markets, he will still find himself at a disadvantage unless he delivers his goods free of charges, or unless he deals with his agents there directly. Spaniards dislike exchanges, costs and duties, and will buy inferior goods that bring them no trouble rather than superior goods that cause them vexation, and Spanish agents take far less interest in pushing goods if they are dealt with through agents in London and Paris, and divide with them their commissions. In other words, if the American exporter uses tact and is duly considerate, his goods will be accepted more readily and sold with greater favor.

THE RUBBER INDUSTRY IN SWITZERLAND.

THE seven rubber factories in Switzerland are confined almost wholly to tissues designed for shoe elastics, the greater part of the product being exported. Six of these factories are in the consular district of Basle, and the seventh is in the district of Zurich. The exports of elastic webbing in 1889 amounted, according to the Consul at Basle, to \$483,300, being destined to France, Spain, Germany, Austria, Russia, the Argentine Republic and Italy—these countries being named first in the order of importance—leaving \$113,600 for other parts of the world. A table is given here of the total value in francs of imports and exports of crude rubber and rubber goods of all kinds to and from all the ports of entry in Switzerland during the year 1889:

	Imports.	Exports.
India-rubber, crude	40,800	8,494
India-rubber thread.....	492,700	2,779
Card cloth.....	208,250	2,025
India-rubber sheet, belting, valves, etc....	365,400	18,463
India-rubber hose.....	322,700	10,617
India-rubber textiles, surgical and household articles, shoes (unsewed).....	445,500	9,209
India-rubber shoes (sewed).....	58,500	1,076
Elastic webbing (chiefly for shoes).....	178,100	2,411,911
India-rubber clothing.....	234,000	8,209

In each of these items, Germany appears to furnish a very large element of the imports. The United States makes a very poor showing in these tables, the whole amount of imports from this country for the year footing up only 28,800 francs. It is suggested, however, by Consul Gifford, of Basle, that such rubber goods as reach Switzerland from the United States are for the most part introduced from Germany, and are not separately noted in the official records. American firms have established branch houses in Hamburg, whence rubber shoes, belting, hose and packing are shipped to Switzerland, being credited to Germany.

According to the statements of local dealers, rubber clothing and shoes are obtained chiefly from England, the quality of the English goods being, it is stated, superior to that of the corresponding American articles. This preference is alleged to exist notwithstanding the fact that the American goods can be sold cheaper than the English. Rubber overshoes manufactured by the Russian-American factory in St. Petersburg enjoy a good reputation and find ready sale.

As far as concerns quality, some of the Consuls find that American rubber goods are considered fully on a level with those of other countries, and might be much more largely used if our factories were as near to Switzerland, geographically, as those of Germany and France. Obstacles to the introduction of our rubber manufactures are the limited consumption of such articles, the length of time necessary to await the fulfillment of an order given, and the higher freight rates, as compared with those of adjacent countries. Thus Germany is able to deliver goods quickly and at very moderate transportation charges, even on small shipments. Consul W. H. Robertson, at St. Gallen, writes: "From climatic causes, the goods do not keep well when stored, and hence are only ordered in quantities to suit the actual demand at the time."

A dealer at Zurich, of long standing in the trade, states that with the exception of rubber thread and rubber shoes, and perhaps hose and belting, the United States stands little chance of competing successfully in the Swiss market. The extension of trade already begun must depend to a great degree upon the American manufacturers themselves. Our manufacturers must reconcile themselves to the conviction that export relations with a market already supplied cannot be acquired in a hurry, but that the field requires plenty of planting and care before good harvests can be reaped.

The same dealer states that as far as rubber thread is concerned, quality and price are what tell. As regards rubber shoes, shape, style and finish are of equal importance, and American manufacturers hoping to sell goods in European markets must consent to adapt their products to European requirements. The North British Rubber Shoe Co., of Edinburgh; the Compagnie Nationale de Caoutchouc, of Paris, and the Russian-American India-Rubber Co., of St. Petersburg, enjoy a very high reputation in Switzerland as to the quality shape and finish of their rubber shoes. American manufacturers, it is asserted, can hope to compete successfully in that market only by engaging experienced firms, established on the spot as informants and buyers, and by following their advice.

It will not do to look upon the export business merely as a periodical offset for eventual slack times at home. On the contrary, export orders should always receive attention first, because of the longer time required for correspondence and delivery. Delays or failures in the supplies, or irregularity in the shapes once adopted, will at once put a stop to the business. How ready our manufacturers are to throw over the foreign orders is evidenced by a letter from a large Boston house to the Zurich dealer in question, saying that "owing to the demand for goods in this country exceeding the supply" it would probably be another season before they could go in seriously for exports. The same dealer states that an invoice of shoes for which he sent to Boston in May, 1890, was not delivered until October, and then with 20 per cent. added to the bill on account of alterations made to suit the Swiss demand. A similar order sent to St. Petersburg, Paris or Edinburgh would have been filled promptly with saleable goods at fixed prices.

Consul George L. Catlin, at Zurich, gives the following list of dealers in rubber goods:

H. Specker, 90 Bahnhofstrasse, Zurich.
J. E. Naef, 10 Marktgasse, Zurich.
L. W. Custer, 83 Bahnhofstrasse, Zurich.
Keyser-Pauly, 8 Thalgaasse, Zurich.
E. Naef, 10 Baerengasse, Zurich.
L. Wollstadt, 69 Bahnhofstrasse, Zurich.
Gust. Wunderli, 4 Limmatquai, Zurich.
L. Wachendorf, 4 Werdstrasse, Aussersihl.

G. L. Tobler, of St. Gallen, is mentioned as an importer who deals in rubber goods.

THE RUBBER INDUSTRY IN ITALY.

THERE is a rubber factory at Milan, that of Pirelli & Co., representing several million francs of capital and employing 1400 persons, and supplying, it is estimated, more than four-fifths of the demand in that district for rubber goods. Some of the product is exported also to Germany, Spain, South America, Roumania, Asia and Africa. The remaining one-fifth of the demand is supplied from Germany, England and a small quantity from France, especially boots and shoes, which the Milan manufacturers do not yet find it profitable to make.

According to the report of the Chamber of Commerce at Genoa, there was exported from that point, during 1889, 57,796 pounds of rubber goods, valued at \$45,397. These are supposed by the local authorities to have been goods manufactured at the large establishment at Milan and sold abroad through its agents in Genoa. About 58 per cent. of these exports were destined to the Argentine Republic and Chili.

The amount of crude rubber imported at Genoa in 1888 amounted to 312,417 pounds, valued at \$204,580. In 1889 the amount increased to 534,999 pounds, of the declared value of \$328,419. This crude rubber was imported almost entirely from England and 85 per cent. of it was sent to the factory at Milan for consumption there. The official statistics at Genoa record a falling off in the importation of rubber manufactures, the total value for 1889 being \$303,947. More than half these goods are credited to Germany, about one-fourth of the amount to England, and about 11 per cent. to the United States.

There are smaller rubber manufactories mentioned as located at Rome, Turin and Narni. A portion of the crude rubber imported at Genoa was despatched to the latter establishments.

No distinction is made in the statistics kept at Leghorn between crude and manufactured rubber. The imports for 1889 are given at 19,144 pounds, valued at \$14,358. It is mentioned that one ton of the rubber imported came from Asia, and the greater part of the remainder from England. The imports of rubber of all kinds at Palermo, for a period of five years, show no special tendency of gain or loss, but the imports for 1889 were much below the average, during this period

amounting to only \$12,443. The only item credited to the United States during this time is one of \$101.60 in 1887.

The importations of rubber goods are doubtless smaller on account of the high rates of duty imposed. The duty on elastic tissues, bands, ribbons, braids, etc., amounts to \$22.30 per 100 kilograms, or 220.46 pounds. On articles of clothing, foot wear, tubes, hose, etc., the duty is \$6.18 per 100 kilograms. There is no duty on crude rubber. The Secretary of Finance is empowered under certain conditions to grant free entry to certain tissues for the use of Italian rubber-manufactories for their exclusive benefit, to the value of not over \$19,300. This privilege, in the opinion of Consul Isaac R. Diller, is to secure the best description of samples of such goods manufactured abroad for the use of the army and navy.

Consul James Fletcher, at Genoa, has made inquiries, but has failed to discover that any comparisons have been made by local dealers between the rubber goods manufactured in the United States and similar goods from other countries. Dealers buy their wares of the firms who sell the cheapest without regard to the country in which they are manufactured. Mr. Fletcher considers the pre-eminence of Germany in the sale of rubber goods in Italy due to the fact that representatives of German houses thoroughly canvass the country in the interests of their employers. This is offered by him as a suggestion for the consideration of Americans who may wish to extend their trade in that direction. The Consul at Milan does not think it would be worth while for American rubber manufacturers to extend their operations into that part of Italy, although the opinion is entertained by many persons that American rubber goods are of a very superior quality. Consul Charles Heath, at Catania, thinks that there would be little benefit to American merchants from trying to introduce rubber goods in his district on account of the very slight demand for such goods.

Primitive Methods of Rubber Manufacture.

THE natives of Nicaragua make rubber bags and blankets but not for exportation. The rubber blankets made there excel anything in that line, it is asserted by some travellers, that is manufactured. These blankets have a cool surface and do not become so heated when exposed to the sun as the blankets that are generally manufactured. They are also devoid of that gummy feeling that is natural to many rubber goods.

The natives use a very simple method to make these rubber articles. The milk as soon as extracted from the tree is put into a bottle and permitted to remain for a few days, until it reaches the right consistency for use. A piece of canvas is then spread upon the ground and the milk poured from the bottles on it, and evenly distributed over the cloth by means of wooden paddles. The milk is not coagulated by any decoction, or by exposure to the air, as is usually the case, but is used in its natural state. A short time suffices for the milk to dry and the blankets are ready for service. The rubber bags pass through the same process, with the exception that the cloth is cut into proper sizes and then stitched into bags.

According to another report, the natives in Nicaragua, to make cloth or clothing waterproof, add a small percentage of sulphur or gunpowder to the fresh milk and boil for a short time. Then they stir the hot mixture, and spread it over the stretched cloth as evenly as possible, two to four times, using a spreading brush, the fibrous net-like coatings found at the attachment of the fronds to the cocoanut tree. This fresh exudation waterproof, according to Mr. J. Crawfords, is superior for rough usage to any made in the United States or Europe, and less liable to "peel" or "scale" off.

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